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Industrial Growth and Industrial Revolutions[1]

By D. C. Coleman

I

The idea of the Industrial Revolution is one of the few items in the private language of economic historians which has passed into common parlance. By now *the* Industrial Revolution has surely earned its right, along with ancient Greeks and early economists, to be called " classical ". But as Sir George Clark pointed out some while ago,[2] other industrial revolutions are amongst us. In the writings of economic historians, revolutions abound. Leaving aside more than one commercial and agrarian " revolution ", the student of our subject is confronted with a succession of industrial revolutions. The late Bronze Age, the thirteenth century, the fifteenth century, the century from 1540 to 1640, the later seventeenth century and, passing over the classical industrial revolution, the late nineteenth and the early twentieth centuries—in all these periods it seems there may be observed industrial revolutions in the economic development of England alone. Other countries have their claimants, for example, Germany and Japan in the late nineteenth century.[3] At the present time, the possibilities of " automatic factories " opened up by the development of electronic devices and their use in industrial control, has stimulated talk of an imminent " second industrial revolution ".[4] This is largely an offspring of the writings of engineers, mathematicians and others normally unacquainted with the works of economic historians. Were they familiar with these they would find, for example, in the writings of the late Professor Schumpeter, that the notion of a " second industrial revolution " had long made its appearance. This variety of uses of the term " industrial revolution " can scarcely fail to be confusing. May it not be that the term has achieved its wide application at the expense of losing its true significance ?

---

[1] Based on a paper read initially at Professor Postan's seminar at Cambridge in November 1953 and later at Professor Ashton's seminar.

[2] *The Idea of the Industrial Revolution*, David Murray Foundation Lecture, University of Glasgow (October 1952). Glasgow University Publication, XCV, 1953.

[3] Reference to the sources for most of these will be found in Clark, *op. cit.*, pp. 12–13. J. A. Schumpeter, *Business Cycles*, 2 vols., New York, 1939, contains various references to industrial revolutions in the late nineteenth and early twentieth centuries, e.g. pp. 397 and 753.

[4] See: Norbert Wiener, *Cybernetics*, New York, 1949, and *The Human Use of Human Beings*, London, 1950; " Towards the Automatic Factory ", in *Planning* (P.E.P.), Vol. XXI, No. 30, June 1955; also correspondence in *The Times*, 8th and 11th November, 1954; articles (by R. H. Macmillan) in *The Listener*, 24th and 31st March, 7th April, 1955; *The Manchester Guardian*, 17th June, 1955, etc.

In the writing of economic history, three main forms of economic or technical " revolutions " may be noted:

(i) The application to a particular industry. This frequently occurs in accounts of the growth of individual industries during the classical industrial revolution and is normally used to describe the introduction of a particular machine or technique which the writer regards as " revolutionising " the productive process in question and carrying with it comparably striking consequences, irrespective of what may or may not be happening in unrelated industries. Professor Carus-Wilson's " Industrial Revolution " of the thirteenth century,[1] resting as it does on the mechanisation of the process of fulling, comes within this category.

(ii) One stage more extensive than this use is the application of the term to particular branches of the economic activities of a society—industrial, commercial, agrarian and so forth. Thus the term " industrial revolution " here means something which happens to industry as a whole, though not necessarily to other branches of the economy. It is implied in the O.E.D. definition: " the rapid development *in industry* owing to the employment of machinery, which took place in England in the late eighteenth and early nineteenth centuries ".[2] (My italics.)

(iii) The widest application is that to a national economy. Here the emphasis is not simply on the effect felt by an industry or by industry as a whole, but upon the consequences to the economy of a variety of changes in the sense that it moves rapidly into some new shape, normally that of the modern industrialised society. The classical English industrial revolution, as usually interpreted nowadays, is the prime example of this but the usage is increasingly extended to cover the same process experienced subsequently by other countries such as the U.S.A., Germany and Japan.

Variations have been played on these themes. One such variation is the building up of (iii) out of material used for (ii). Professor Nef's " industrial revolution "[3] of the hundred years from 1540 to 1640 falls within this category. To some extent this implies an equating of the terms " industrial revolution " and " industrialisation ".

The appearance in the subject of so many and such a variety of industrial revolutions raises the question of their identification. How are they to be recognised? Are they all of the same nature? The increasing use of quantitative methods in economic history presents us with industrial revolutions in statistical clothes. Is the concept something which can be measured, or at any rate detected, in appropriate statistical series? What is the relation of the concept, as used and developed by historians, to the studies by economists or statisticians of long-period industrial growth?

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[1] E. M. Carus-Wilson, " An Industrial Revolution of the Thirteenth Century ", in *Econ. Hist. Rev.*, XI, 1941; also reprinted in *Essays in Economic History* (ed. E. M. Carus-Wilson), London, 1954, and in E. M. Carus-Wilson, *Medieval Merchant Venturers*, London, 1954.

[2] Quoted Clark, *op. cit.*, p. 11.

[3] J. U. Nef: *The Rise of the British Coal Industry*, London, 1932, I, p. 165; " The Progress of Technology and the Growth of Large-scale Industry in Great Britain, 1540–1640 ", in *Econ. Hist Rev.*, V, 1934 (reprinted in *Essays in Economic History*); and *War and Human Progress*, Cambridge, Mass., 1950.

The aims of this article are as follows: to examine some of the implications of the use, by certain economic historians, of the term "industrial revolution"; to relate these implications to the use of industrial growth curves; to examine the claim that the automatic factory is precipitating a second "industrial revolution"; and finally, in an attempt to give some recognisable meaning to the term "industrial revolution", to suggest certain very rough criteria for the continued employment of this overburdened phrase. In order to illustrate some of the problems involved in the relation between growth curves and industrial revolutions, it is proposed to examine one industry in some detail and to suggest the possible applicability of the argument to other fields.

II

The one industry which it is proposed to examine in some detail is the English paper industry. A number of reasons combine to make this suitable for the purpose. It has a long history, spanning several centuries; it is an industry which peculiarly mirrors the growth of our industrial civilisation, for its products find their way into extremely diverse and characteristic uses. Furthermore, it is especially useful for the purpose of examining the "industrial revolution" in one industry and seeing it in quantitative terms, for it is possible to construct tolerably reliable series to cover the period from the early eighteenth century to the present day. And finally, its technical and economic history follows a course similar to that of other and better known industries.

Before examining the quantitative evidence of industrial growth which it offers, it is necessary to make a brief digression into some of the details of its technical and economic development.[1]

The techniques of paper making can be readily divided into a number of processes, just as can, for example, the techniques of the cloth industry. The history of technical progress in the latter is a history of mechanisation stretching from the twelfth century (or earlier) to the early nineteenth century, in the approximate order: fulling, spinning, weaving, carding and combing, finishing, together with such comparatively early applications of industrial chemistry as the use of chlorine in bleaching, improvements in dyeing and the like. In paper making, technical progress followed a very similar course over roughly the same period of time. The main processes in the order in which they were effected (which is also the order in which they take place) are: raw material preparation, bleaching, forming the paper, drying and finishing. This includes the same early application of chemistry to industry in the shape of chlorine for bleaching. In addition, there followed a further crucial innovation in the industry, providing a new raw material—the discovery of wood pulp.

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[1] For a note of the main secondary sources drawn upon in this section, see my article in *Economica*, February 1954, pp. 32–3 n.

Before the later nineteenth century, the major raw materials for paper making were linen, and to a lesser extent cotton, rags.[1] The pulping of the raw materials, which is the essential element in the first process, was originally carried out by hand, the rags being mixed with water and pounded. At what stage and where this process received its first mechanisation, is not precisely known. The industry is said to have reached southern Europe by the eleventh and twelfth centuries, having come from China via the Middle East. It is claimed that in mid-twelfth century Spain a stamping mill, operated by water power, was at work macerating the rags in a series of large mortars. Such a mill was certainly in use at Nüremberg at the end of the fourteenth century, and thereafter various types of stamping mill, normally driven by water but sometimes by wind, formed the vital feature of the European paper mill until the eighteenth century. It then began to be replaced by an improved type of beating engine; this was at first driven by water power but later by steam. With many improvements and variations in detail, the preparation processes of washing, beating and pulping remain in principle the same today.[2]

The introduction of chlorine for rag bleaching need not detain us long. It came into use in the 1790s and was an obvious corollary to the similar results in the textile industry of Scheele's discovery.

Meanwhile, until the introduction of the paper-making machine in the first decade of the nineteenth century, the actual forming of the paper was everywhere a hand process. The parallel with the textile industry is striking. Just as water power was applied to fulling and much later to spinning, whilst weaving remained an entirely hand operation, so was power applied to rag preparation whilst the forming of a sheet was still done by hand. The linking of rag preparation to water power meant that paper mills were to be found on fast running streams just as were so many mills, similarly powered, in other industries. To the striking technical resemblance between the fulling mill and the stamping mill there is added the tendency to determine location; indeed, when the paper industry was expanding in England from the sixteenth to the eighteenth centuries and the cloth industry geographically contracting, many former fulling mills were turned into paper mills.

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[1] The essential chemical constituent of paper, be it made by hand or by machine, from rags, old ropes, straw, esparto grass or wood pulp, is cellulose, the main component of plant tissues. The essence of its manufacture, by hand or by machine, is that the cellulose fibres should be macerated until each individual filament is a separate unit, then mixed with water in such a way that, by the use of sieve-like screens, the fibres can subsequently be lifted from the water in the form of a thin layer, the water draining off and leaving a sheet of matted fibres. This thin sheet is paper.

[2] The making of wood pulp is, of course, an entirely different procedure, normally carried on in or near the forest areas.

By the end of the eighteenth century, then, paper making was a widespread European industry, Italy, France, Germany, Holland and Great Britain all having many mills. Water power and steam power (though the latter in only a very few places) had been applied to the first process and chemistry had made its mark on bleaching. In the first decade of the nineteenth century the paper-making machine was introduced in the English industry. In the technical changes which it introduced, striking resemblances are again noticeable to the comparable changes in the textile industry in spinning and weaving: it was a straightforward mechanisation of hand processes. In the hand process, the size of the sheet is normally limited to what can be conveniently manipulated by the paper maker; production is slow and labour highly skilled. The machine simply mechanised the whole procedure by forming the sheet on an endless wire gauze or mesh, thus allowing theoretically endless sheets of paper to be made. The modern machine is exactly the same in general principle though, of course, with many improvements in detail and very much larger and faster.

Once the making had been mechanised, the mechanisation of the drying and finishing processes followed rapidly. By the mid-nineteenth century, mechanisation was complete. The output of the United Kingdom had multiplied about seventeen times since the mid-eighteenth century and the stage was set for the next crucial development.

During the 1850s and 1860s, the gales of the free trade movement had swept through the paper industry as elsewhere and removed both the excise duties and the customs duties on the import of foreign paper. By this time machinery had been extensively adopted in the paper industries of other countries and these industries were expanding rapidly, notably in the U.S.A., Germany and France. The resulting substantial increases in international production and trade in paper meant in turn extreme pressure on raw material supplies. Unsatisfactory and peculiarly inelastic supply conditions had for long been tending to make rags costly and many attempts to find substitutes had been made. Not until 1860 was any appreciable success achieved when the use of esparto grass for paper making was patented and put into commercial operation. Of far greater significance, however, were the numerous experiments in the use of wood pulp, carried on in this country and elsewhere, which culminated in the perfecting of the chemical processes of producing wood pulp in the 1880s. The modern paper industry is substantially based on wood pulp, and the advent of this as the major raw material meant a reorientation of the industry in many ways, although not causing any radical revisions in the machinery by which paper was actually made. It had substantial international repercussions in that it brought a new stimulus to the opening up of the great softwood forests of Scandinavia and Canada, in which countries integrated pulp and paper mills have been developed; at the same time the English industry became dependent for the bulk of its raw materials on imported substances. The new international angle to the industry brought new types of integration in which press magnates appeared as the owners at once of forests, paper mills, printing presses and newspapers. On the technical side it brought the industry within the ambit of the chemical industry—for although the paper-making machine is still basically the same, the pulp-making processes are different and, moreover, the technical questions of the industry are of a nature to which applied chemistry may be expected to produce the answers. It has been said that today paper mills are " built by engineers and run by chemists ".[1]

The industry's technical history thus has three landmarks: three crucial innovations—a medieval mechanisation of the preparatory processes akin to the mechanisation of fulling; mechanisation of the making process during the classical industrial revolution; and the introduction of a new raw material. This last development has brought the industry into the ambit of what has been described as a " second industrial revolution " (before the present tying of that label on to the expected consequences of the automatic factory) or, indeed, the fifth if we follow Schumpeter's numbering and terminology.[2]

III

What light does this shed on the various industrial revolutions?

To take first those for which there are relevant statistical series: those covering the period including the classical industrial revolution exhibit a highly characteristic pattern. Fig. 1[3] reveals just the picture of steeply rising output which we have come to associate with large numbers of individual industries, with population growth, overseas trade, imports of raw cotton and so forth, during this period of English economic history.

It is, in short, a typical picture.[4] The machine brought a great increase in productivity and did away with the great dependence on skilled paper-making labour. Mills became bigger, new and larger mills sprang up in Lancashire, near the coalfields and the new towns of the north; those in the remoter counties began to disappear. Increasing production was, as usual, matched by a declining total number of mills.[1] The whole picture, in short, is one of the classical industrial revolution *in one industry:* the first of the uses to which, as suggested above, the term is sometimes put.

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[1] J. Grant, " Pulp and Paper ", in *What Industry Owes to Chemical Science*, 3rd ed., 1945.

[2] *Op. cit.*, I, 397.

[3] Details of the sources from which these and the following graphs were constructed will be found in the Appendix (*infra*, pp. 21–22).

[4] The shape of the curve showing the imports of raw materials reflects, particularly after the 1840's, both the growing world demand for paper-making materials and the existence of the foreign duties or prohibitions on their export. The widening gap between it and the output curve from about 1790 is accounted for partly by increasing home supplies of rags, from greater home production and consumption of cotton and linen textiles, partly by higher productivity in paper manufacture, and partly by the fact that chlorine bleaching permitted the use of a much wider range of coloured rags.

What of the " second " or " fifth " or " twentieth century " industrial revolutions ? How does paper fit into what Schumpeter called " the Kondratieff of electricity, chemistry and motors " ? Fig. 2 exhibits the same picture for this period as did Fig. 1 for the earlier period.[2]

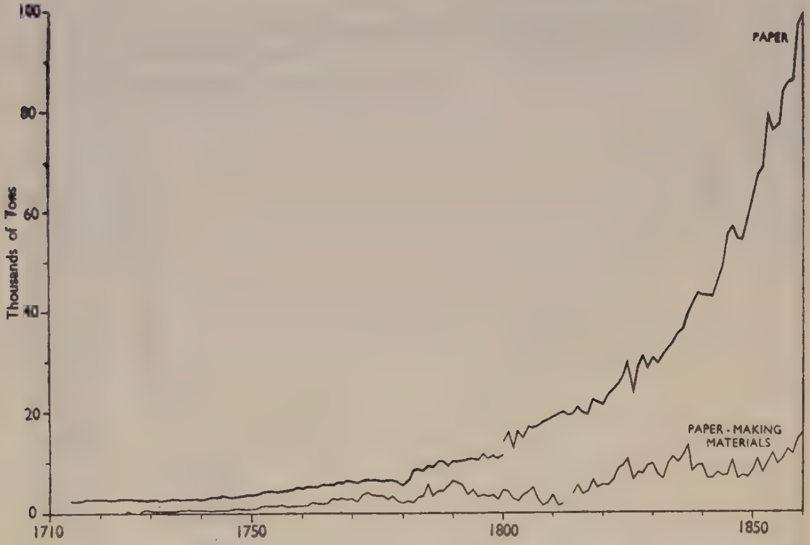

Fig. 1. English and U.K. Paper Production, 1714–1860, and Imports of Paper-making Materials, 1727–1860.

Here, then, in purely quantitative terms there appears to be a repetition of the " industrial revolution " process as applied to one industry. And, moreover, we know too that it was accompanied by the major reorientation of the industry already described, by the new dependence on imported raw materials as reflected in the parallel movements of output and import curves, by changes in location and by increases in the size of mills. There was a continued and corresponding decline in numbers of mills in conjunction with steeply rising output; in the U.K. as a whole the number fell from rather over 400 in the 1850s to under 200 today, whilst during that century output had multiplied about 30 times. Behind the mere shape of these curves lies a complex pattern of changes in techniques, organisation and industrial structure. Today the industry and its imported raw materials are of major importance in the country's economy. The increases in output during the 1920s and 1930s were in striking contrast to the depression which affected so many industries. At once a very old industry, it also apparently behaved like a typical " new " industry.

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[1] In 1785 licences issued to paper and pasteboard makers in England totalled 381; in 1816 the figure of 522 corresponded to a total of 502 units at work; the number of licences reached its peak, at 643, in 1829 and declined thereafter as machinery left its mark; by 1860 there were only 306 mills at work in England and Wales.

[2] Imports of paper-making materials comprised rags, esparto and wood pulp.

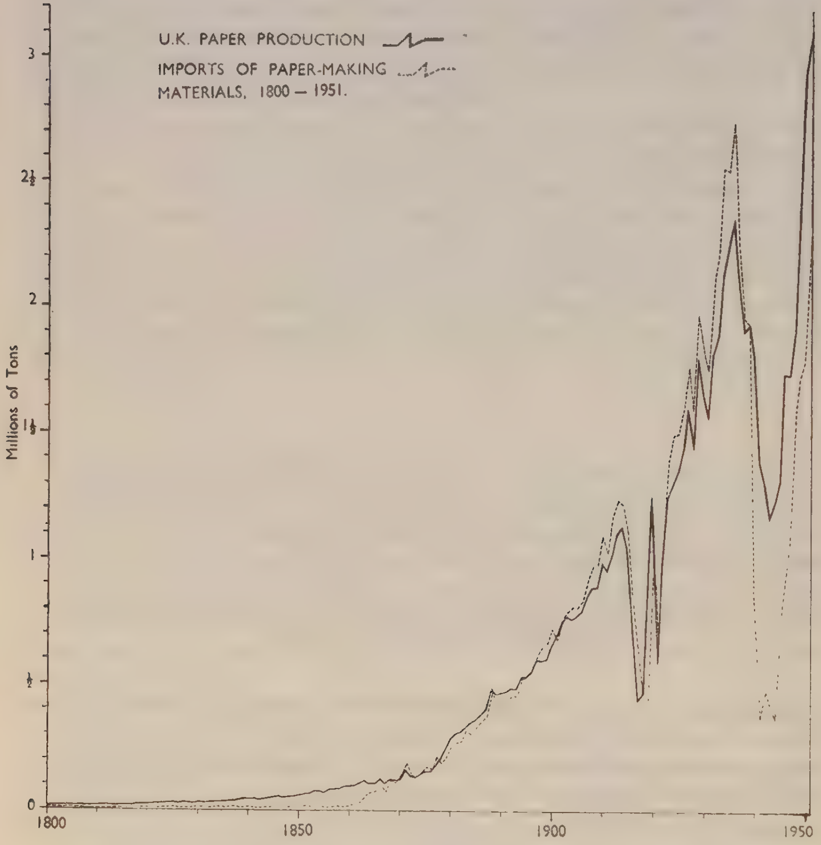

Fig. 2. U.K. Paper Production and Imports of Paper-making Materials, 1800–1951.

How are we to assess these patterns of industrial growth? If the use of the term " industrial revolution " in its application to a single industry is allowed, then it seems clearly evident that we must say that the paper industry has passed through two such revolutions. But are we justified in accepting the figures presented in this way, each shaped, so to speak, in the comparatively small mould of a hundred or a hundred and fifty years? These are the conventional dishes in which the "revolutions" are so frequently cooked. But if we take the long-period view, which our figures allow, and at the same time plot these figures as growth curves, the picture appears in a rather different light.

From this it is equally clearly evident that the second "industrial revolution" in the industry offers nothing more, in quantitative terms, than a continuation of the rate of growth initiated during the classical industrial revolution period. Even this does not show up very clearly but it appears to start with two changes from the comparative stagnation of the early decades of the eighteenth century: one commencing between 1740 and 1750 and another between 1800 and about 1810. The introduction of wood pulp is scarcely visible.

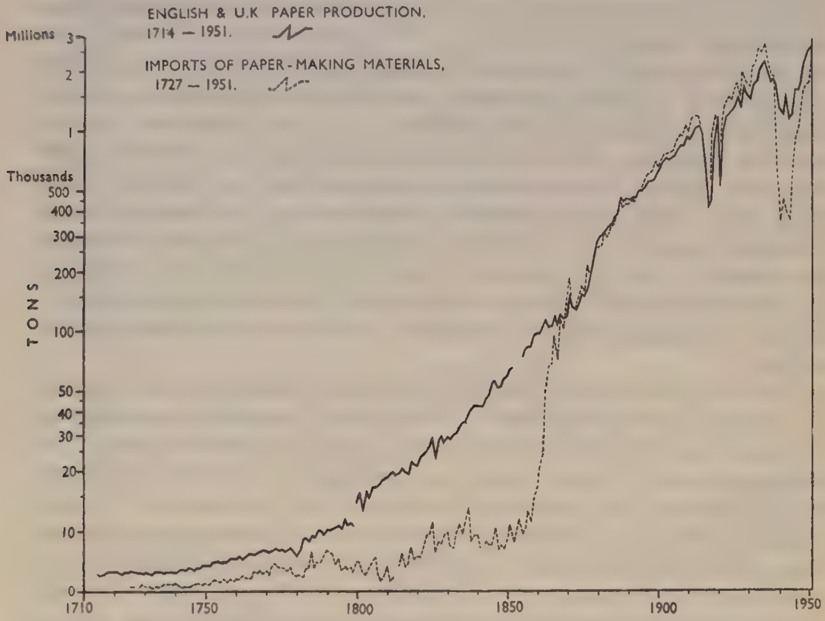

Fig. 3. English and U.K. Paper Production (1714–1951) and Imports of Paper-making Materials, 1727–1951 (log. scale).

Much has been written about the shape of industrial growth curves.[1] Professor Rostow has written: "In general, although a phase of increasing rate of growth may occur in the very early stages of an industry, these growth patterns appear to follow roughly the course of a logistic curve; that is, they exhibit regular retardation ".[1] Warnings have been duly uttered to the effect that although " we can see the curve of growth as logistic rather than exponential ", this is not " to suggest that all growth curves will be of this type ".[2] Indeed, Professor Kuznets and, deriving from him, Dr. Hoffman, have both noted the paper industry as providing an exception to the logistic curve.[3] Schumpeter, constructing his own elaborate model of economic movement, warned us against evolutionary theories of organic growth and emphasised that too much trust should not be placed in the gradient of any particular logarithmic straight line. This he saw as offering merely what he called a " descriptive trend " or " a piece of economic history in the form of a curve ", though he did admit that we were on " somewhat safer ground " in fitting particular types of curve to time series showing quantities of individual commodities.[4] It is not proposed here to consider the nature of " laws of industrial growth " or whether indeed they exist, though it seems perhaps worth pointing out that the logistic curve might well be an expected proposition on the simple criterion that decreasing returns will appear at some stage, i.e. without postulating any specific " law " of industrial growth as a whole. In the case of the paper industry it is clearly evident that it was only the discovery of wood pulp which prevented the regular retardation from showing itself earlier.

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[1] As well as Schumpeter, *op. cit.*, see: S. Kuznets, *Secular Movements in Production and Prices*, New York, 1930; W. W. Rostow, *The Process of Economic Growth*, New York, 1952; R. Glenday, "Long Period Economic Trends", in *Journal of the Royal Statistical Society*, CI, 1938; also W. Hoffman, "The Growth of Industrial Production in Great Britain: a Quantitative Study", in *Econ. Hist. Rev.*, 2nd series, Vol. II, 1949–50, pp. 162–180.

It is very questionable whether such quantitative data can be used as " pieces of economic history ",[5] without at the same time considering in detail the technical developments which lie behind them. The continuation of the same growth rate in paper was entirely dependent on the discovery of a *substitute*, in this case for raw material. If paper made from wood pulp were to be regarded as a different substance from that made from rags (which chemically it is *not*, see *supra*, p. 4, n. 1), then there would already be a logistic curve for rag paper followed by another, still as yet of the exponential type but likely to show retardation as soon as the softwood forests begin to be exhausted. The curve of the imports of paper-making materials in Fig. 3 gives some indication of this.[6] If figures existed for the production of papyrus, parchment

[1] Rostow, *op. cit.*, p. 100.

[2] Hoffman, *loc. cit.*, p. 166.

[3] Kuznets, *op. cit.*, pp. 22–24; Hoffman, *loc. cit.*, p. 171. It should be pointed out that continuing growth is not here linked to rising exports. Paper exports form only a very small percentage of production and we remain net importers.

[4] Schumpeter, *op. cit.*, I, pp. 201–4, II, pp. 491–4.

[5] Especially in the manner followed by Hoffman both in the article cited above and in the uncritical acceptance of various statistics (including those for paper in the eighteenth century) which go to make up his index of Britain's industrial production. See his " Ein Index der industriellen Produktion für Grossbritannien seit dem 18. Jahrhundert ", in *Weltwirtschaftliches Archiv*, 1934 (II), p. 383.

[6] This has, of course, a national coverage only and consequently the shape of the curve is partly due to the fact that increasing world demand for wood pulp, together with the growth of integrated pulp and paper mills in the forest areas, have to some extent put the English industry in an economically disadvantageous position.

and paper, one would *a priori* expect to see, for what might be called the " Writing Materials Industry ", a sort of family of successive logistic curves, the envelope of which would trace out a curve which would not yet show signs of permanent retardation in growth. Fig. 4 showing the output curves of hand-made paper and then its successor machine-made paper will serve as an illustration of this.

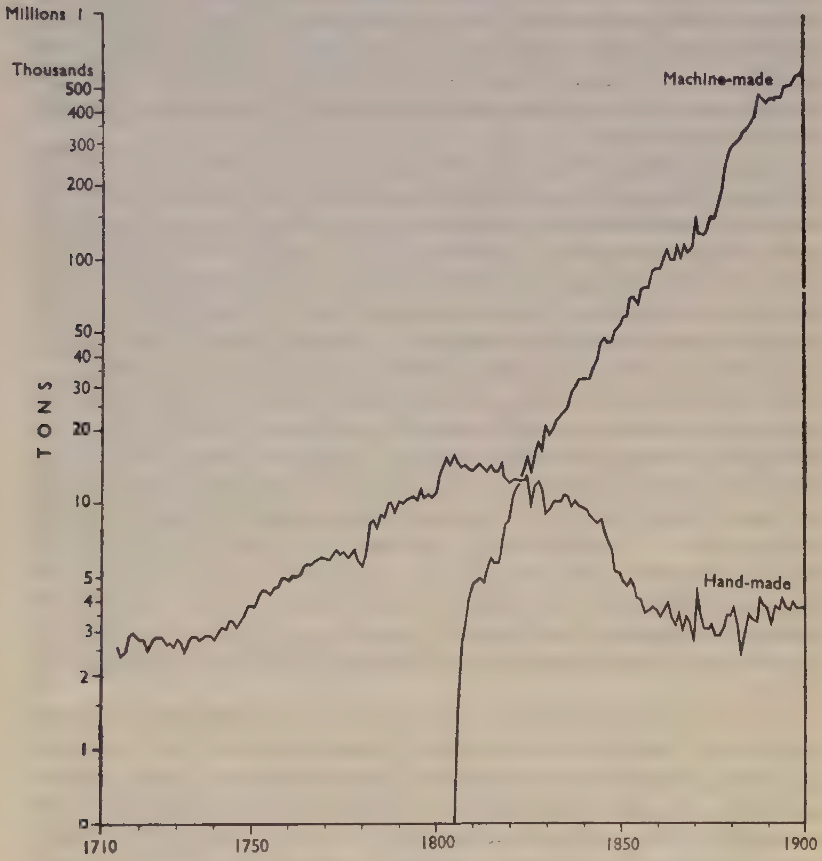

Fig. 4. English and U.K. Production of Hand-made and Machine-made Paper, 1714–1900 and 1806–1900 (log. scale).

Two questions follow from this: how far can such an argument be generalised to apply to other industries, and—the old chestnut—what constitutes an industry? If we are willing to allow a certain common-sense elasticity in answering the latter, especially in the general direction of end uses to which products are put, it is not difficult to think of many examples which fit this pattern of industrial growth. The argument applies equally, for instance, to the development of the natural and then the synthetic fibre industry; at an earlier stage in the history of English and European textiles, the substitution of the "New Draperies" for some of the older types of cloth offers a similar illustration. It applies also to the successive substitutions, first, of cheap iron (both cast and wrought), for wood, leather and other earlier constructional materials, and then after the 1860s, of steel for iron. The rise and fall of charcoal output, had we the figures, could be set against that of coal and the latter, in turn, matched with the statistics of the oil rush. The statistics of raw material imports and, in some instances, of exports in such industries as these would show appropriate changes comparable to those revealed above for the supply of paper-making materials.

Successive indices of this type reveal the constant change, the continual posing and solving of technical and economic problems in a manner in which national industrial growth curves, themselves composed of curves for conventional "industries", do not. Indeed, the latter often conceal more than they reveal. What is the steel industry or the metallurgical industry or the transport industry or the textile industry for the purposes of tracing the course of industrial growth? Schumpeter noted "the broad fact of great steadiness in long-time increase . . . both in the sense of a rough constancy of the gradient of the trend and in the sense of what, merely by way of formulating a visual impression, we may term the general dominance or trend over fluctuations". He illustrated this by reference to industrial production indices relating to Great Britain for 1785–1914 and U.S.A. and Germany from the 1860s to 1914.[1] But in the truly long run, in the long focus of history, what exactly does this mean? Or again, what is the value to the economic historian of a production index in which even the classical industrial revolution can be made if not quite to disappear at least to appear as no more than a small change in the industrial growth rate?[2]

Now the studies, mostly by economists and statisticians, in which appear such quantitative analyses of industrial growth, have not paid over much attention to the question of how the concept of the industrial revolution, as otherwise used by historians, should appear in these series. But it seems clear that if we are to accept the arguments outlined above, the term "industrial revolution", when referring to particular industries in their conventional forms, can be applied to every innovation which simply *maintains* the existing rate of growth of output.

If this appears to be a detraction from the significance of the term as normally understood and, indeed to be something of a *reductio ad*

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[1] Schumpeter, *op. cit.*, II, pp. 492 and 494.

[2] S. Kuznets, "Statistical Trends and Historical Changes", in *Econ. Hist Rev.*, 2nd series, Vol. III, No. 3, 1951, p. 269: "in the overall indices of production in Great Britain prepared by Walter Hoffman, the Industrial Revolution does not appear as a truly revolutionary upheaval".

absurdum, then a remedy may perhaps lie in concentrating on *increase* in the growth rate, such as is registered in the paper industry, during the classical industrial revolution.[1] Should we, then, retain this crucial mechanisation as indicative of the true " industrial revolution in the paper industry " ? Now if this is done, there seems to be no reason why we should not also accept earlier mechanisation, however simple, which performed the same essential quantitative feat. And, moreover, if we examine that feat a little more closely it is seen to consist essentially of the mechanisation or other crucial improvement of one process in the industry which, in turn, brings pressure to bear upon the other processes. If it could be shown to have thus operated, as is not unlikely, then the medieval application of water power to the rag-beating processes in the paper industry would seem to have a valid claim to the title. Doubtless, other industries might have similar pretensions: along with the stamping mill there may go the fulling mill, corn mill, the slitting mill, and the blast furnace with water-powered bellows, and more besides. Admittedly, figures are not available to prove that such innovations did in fact increase growth rates, but other sorts of evidence suggest that they certainly marked turning points in the development of the industries concerned and certainly had striking effects on industrial location. Professor Carus-Wilson is explicit about the nature of her " industrial revolution " and the claims which she makes for it: " the mechanizing of the first three cloth making processes during the eighteenth and nineteenth centuries is a commonplace of history, but the mechanizing of the fourth during the thirteenth century, though it gave rise to an industrial revolution *no less remarkable* has attracted scarcely any attention ".[2] (My italics).

So now even if the late nineteenth and early twentieth century " revolutions " are rejected, we are still left with two " industrial revolutions " in the paper industry, and indeed on these arguments the same would apply to many other industries at many other times.

IV

Perhaps, then, the whole conception of an industrial revolution in a particular industry spells dangerous multiplicity. If safety does not lie this way, can it be found in the wider use of the term: in its application to industry as a whole or to the economy as a whole ? Outside the classical industrial revolution, the example best known to economic historians is perhaps Professor Nef's English " industrial revolution " of 1540–1640. In examining an era barren of detailed or continuous statistics, the assessment of its industrial development tends to be an admixture of various sorts of quantitative and non-quantitative evidence of one sort or another, the whole only too often amounting to a sample

[1] Although if it were possible to extend the series further back in time, it is quite possible that this apparent increase would disappear.

[2] Carus-Wilson, *op. cit.*, p. 40.

very far from random. Economic historians are indebted to Professor Nef for his fundamental researches into the coal industry, for pointing to industries once ignored and for unearthing the long roots of industrialisation. But there is reason to suppose that the " industrial revolution " which he has made his own owes more to the vigour and enthusiasm of his writing than to the typicality of his samples. The claims which he makes for his revolution have a familiar ring: " The introduction of new industries and of new machinery, tools, and furnaces in the old industries, had brought about technical changes in the methods of mining and manufacturing *only less momentous* than those associated with the great inventions of the late eighteenth and early nineteenth centuries."[1] (My italics.) In a more recent work this " early English industrial revolution " is said to have marked " the genesis of industrial civilization " and to have prepared the way for the eventual industrialisation of the world.[2]

Although it is not feasible here to embark upon a comprehensive examination of these claims, it is possible to give some indication of the way in which this " revolution " has apparently been built up.

According to Professor Nef, " tens of thousands of work people " were swept into " hundreds of new, capitalistically-owned enterprises ", the introduction of which " during the last sixty years of the sixteenth century opened an entirely fresh field for the growth of industrial capitalism ".[3] Amongst such industries was paper making. For evidence on a scale of England's paper making at this time, Professor Nef relies on what has been written about John Spilman's mill, at work at Dartford in 1588. That the paper mill of this period, with its water wheels, stampers, buildings, and apparatus, represented something much more substantial in the way of fixed capital than the weaver's cottage and loom is scarcely open to doubt. But that any appreciable number of mills were of the size which Spilman's was alleged to be is very unlikely for a century or more after 1588. Professor Nef has to admit that Thomas Churchyard in his poem about Spilman's mill " probably exaggerated when he spoke of 600 workmen ", confining himself to the assertion that " the enterprise certainly employed scores of hands ".[4] But did it? And how many scores? And if it did, how many other paper mills were there that did? In early Stuart England the bulk of the paper used in this country was imported and continued to be for some time. Nor is there any reason to suppose that the average paper mill of the time represented a striking concentration of capital and labour. It was normally a building not much larger than a corn mill; it was leased from a landlord at a rent of round about £50 per annum; it probably employed about a dozen people in all, including the master paper maker himself, for a mill with one vat. And the majority were still one-vat mills: in the 1730s, the average number of vats per mill was about 1.2.[1]

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[1] " Progress of Technology ", in *Econ. Hist. Rev.*, 1934, p. 22. See also Nef, *Rise of the British Coal Industry*, I, p. 165.

[2] *War and Human Progress*, p. 15.

[3] " Progress of Technology ", pp. 8 and 22.

[4] *Ibid.*, p. 7.

Did such " capitalistically-owned enterprises " as these really help to open " an entirely fresh field for the growth of industrial capitalism " ? As with shipbuilding,[2] so with paper-making: Professor Nef's claims seem to owe much to untypical examples. It seems highly likely that a careful examination of other industries which figure in his revolution—mining, metal manufacture, alum and copperas making, and so on—would reveal this same method by which a national " industrial revolution " has been constructed out of a number of innovations in industry. This is not in the least to deny that the development of these industries marked a significant variation on domestic production or that they represented, taken together, an important phase in the slow growth of early industrialisation; but this is quite different from inflating them into an " industrial revolution " and equating this with the transformation wrought in the nineteenth century.

The main item, indeed, in many ways the basis, of Professor Nef's revolution is the coal industry. Here the evidence does not rest simply on increases in scale and capital outlay. The " industrial revolution " he sees as ending with the Civil War; and thereafter " although there was a recovery after 1660 and the production of British coal, cloth and paper grew during the eight decades that followed the Restoration of that year, it was not until at least the 1750s that the rate of increase in industrial output was again as rapid as during the period 1540–1640 ".[3] No adequate statistical series are available to support this statement; it rests upon the type of non-quantitative evidence mentioned above, together with Professor Nef's own estimates relating to the growth of the British coal industry; these show a 14-fold increase between 1551–60 and 1681–90, a 3-fold increase in the following century and a 23-fold increase between 1781–90 and 1901–10.[4] Further, the fact that there appears to be a 14-fold increase in one century and only a 3-fold increase in the next is used, together with its repercussions and other allied changes, as part evidence for an industrial revolution in the economy as a whole.

There is one obvious objection to this: comparatively large rates of increase will naturally appear whilst absolute amounts are small and/or whilst an industry is new. This can be clearly seen in the growth of such modern industries as oil, aluminium, synthetic fibres and many others: it is also reflected, as has been shown, in the early years of the growth of machine-made paper and in the import of paper-making materials into this country after the invention of wood pulp (see Figs. 3 and 4). The charcoal-coal relationship is, indeed, just such a thing as is illustrated in Fig. 4 and is consequently open to the same objections as a candidate for the title of " industrial revolution ", quite apart from its use as a basis for extending the revolution to the country as a whole.

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[1] H.M. Customs and Excise Library: Treasury-Excise Correspondence, 1733–45, ff. 245–6 (see Appendix, *infra*). Other evidence from Port Books, leases of mills and various sources, details of which will be given in the author's forthcoming work on the history of the paper industry.

[2] See D. C. Coleman, " Naval Dockyards under the Later Stuarts ", in *Econ. Hist Rev.*, Vol. IV, No. 2, December 1953, for this aspect of Professor Nef's " revolution ".

[3] *War and Human Progress*, p. 149.

[4] *The Rise of the British Coal Industry*, II, pp. 19–20.

In all this Professor Nef was supported by Schumpeter who, believing the term to be outmoded and misleading, held the classical industrial revolution to be " on a par with at least two similar events which preceded it and at least two more which followed it ".[1] To Schumpeter these revolutions were long cyclical movements of the sort detected by Kondratieff. He firmly rejected the idea that the industrial revolution was a " unique event or series of events that created a new economic order ".[2] Indeed, we can hear exactly the same sort of claims as those made by Professors Carus-Wilson and Nef: writing of the Kondratieff beginning in 1898, Schumpeter described it as being caused by an " economic revolution *analogous in every respect* to the ' industrial revolution ' of text-book fame ".[3] (My italics.)

V

It is now time to take some note of the latest recruit to the ranks of " industrial revolutions ". Not a great deal can be said of it as this new " second industrial revolution " is still, to some extent, more a matter of prediction than of evidence. But it would not perhaps be difficult to find a place for it in a scheme of economic growth envisaging a series of " industrial revolutions ". The invention of the vacuum tube or electron valve and its application to a variety of problems of communication, computation and control could be represented as the crucial technical innovation; on this could be based the development of " automation " and the increases in industrial productivity and output associated therewith; the process would appear essentially as the substitution of automatic control for human control; the social and economic effects arising from all this would, finally, provide the requisite justification for seeing it as industrial revolution.

Quite outside this hypothetical pattern, those who speak of these developments simply as " the second industrial revolution " put their whole emphasis upon the distinction between automatic operation and automatic control, between the " first industrial revolution " in which mechanisation replaced man's muscles and the " second industrial revolution " which will make automatic work that was previously done by his brains.

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[1] *Op cit.*, I, p. 253.

[2] *Ibid.*

[3] *Ibid.*, I, p. 397.

> " . . . the first industrial revolution, the revolution of the ' dark satanic mills ', was the devaluation of the human arm by the competition of machinery. There is no rate of pay at which a United States pick-and-shovel labourer can live which is low enough to compete with the steam shovel as an excavator. The modern industrial revolution is similarly bound to devalue the human brain at least in its simple and more routine decisions. Of course, just as the skilled carpenter, the skilled mechanic, the skilled dressmaker have in some degree survived the first industrial revolution, so the skilled scientist and the skilled administrator may survive the second. However, taking the second revolution as accomplished, the average human being of mediocre attainments or less has nothing to sell that is worth anyone's money to buy ".[1]

This view seems to be based on a number of fundamental misconceptions.

First, it is entirely misleading to represent the classical industrial revolution as the replacement of muscles by machines. This popular view almost certainly stems from an over-emphasis upon mechanisation of textile manufacture. The power loom or the " mule " do fit into this picture just as does the paper-making machine or the hydraulic press. But the major innovations in, for example, the iron, steel and chemical industries between 1760 and 1860 were not of this nature at all, and even the steam engine itself often replaced not human muscles, but water power or wind power.

Secondly, the distinction between automatic operation and automatic control is by no means clear—either in time or in nature of process. Such medieval mechanisations as the fulling or stamping mills can be represented as steps towards automatic operation just as the classical industrial revolution can be seen as marking a much larger and more rapid move in the same direction. It is possible to trace the principles and practice of automatic, continuous flow production, through the development of mechanical handling devices, back to the eighteenth century. Similarly, the use of various valves, governors, and other automatic control devices can also be traced back to the same period, or earlier. Since those days both automatic operation and automatic control have been extending in use, the latter especially in this century. The photo-electric cell, sister invention to the vacuum tube, has been used for some time both for various control processes, regulating or inspecting industrial products, and for various operational purposes, such as opening doors. Very high degrees of both automatic operation and automatic control (incorporating the use of electronic devices) have already been achieved in some industries, notably oil refining and motor vehicle manufacture.[2]

Thirdly, it is an obvious exaggeration to imply, as appears to be implied in the arguments of the " second industrial revolution " enthusiasts, that the classical industrial revolution has enabled man, even today, to dispense with physical effort. Just as the existence of many complex economic, social and demographic factors (over and above the variations in production techniques mentioned above) makes nonsense of the picture of machinery simply replacing muscles, so does it seem equally unlikely that a world of automatic factories will be ushered in to replace all but the more advanced operations of the human brain. The classical industrial revolution got into its stride at a time of unprecedented population growth; yet in spite of the dislocation of labour which it involved, in spite of hardship to many, a vast amount of far more regular employment came into being in the course of the nineteenth century than had ever been known amongst the underemployed masses of the pre-industrialised world. New jobs came into being, new categories of employment were opened up, new skills replaced old skills. The skilled mechanic did not " survive the first industrial revolution ": he was created by it. The extension of " automation " will doubtless give rise to serious economic and social problems. These are not the concern of this article, but it may not be out of place to suggest that a more careful consideration of these possibilities in the true light of the industrial revolution might prevent a stampede of grandiose claims and inappropriate terminology.

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[1] Wiener, *Cybernetics*, p. 37.

[2] " Towards the Automatic Factory", *passim.*

Fourthly, and perhaps most important from the economic historian's viewpoint, to represent the notion of " automation " as something radically different from what has gone before, to cut it off and see it as marking a " second industrial revolution ", is to empty much of the real meaning of the term " industrial revolution ". Of course, there is a radical difference between the potentialities of electronic devices and, say, the centrifugal governor, just as there was and is between electric power and the steam engine. But this is integral to the nature of industrial development, and of economic growth in the industrialised era, and that this should be so stems essentially from the nature of the classical industrial revolution.

VI

How, then, are we to accept these various revolutions ? What relation do they bear to the classical industrial revolution ? Are they all identical phenomena ? Although the Kondratieffs of Schumpeter's ingenious cyclical model may seem to be identical phenomena within that structure, they are not historically identical in any sense other than that in which certain not very adequate quantitative series can make them seem so. Nor again are they the same as a thirteenth century revolution in the process of fulling, although such a revolution could form a vital constituent of a Schumpeterian " industrial revolution ".

Perhaps it is time for a new " historical revision " of the " industrial revolution ". When Mr. H. L. Beales wrote his historical revisions twenty-six years ago,[1] the dangers were not simply that it should be considered a unique phenomenon but that it was arbitrarily limited in time, without roots in the past and truncated in its development and application by the inadequacy of the word " industrial " and the overtones of the word " revolution ". Since then much has been done to show that the classical industrial revolution had its roots in the scientific thought and economic activity of the sixteenth and seventeenth centuries, and that it came to bear its fruit in decades long after the first Reform Bill was passed. But today the dangers are different: today we have too many industrial revolutions and too many ways of discovering them.

On its technical side *the* industrial revolution was the first major and large-scale success in man's efforts to apply his growing mastery of natural forces to economic production. It transformed this country in a way in which no country had ever before been transformed; and the process of industrialisation which is still transforming once backward areas is the carrying abroad of this industrial revolution. Modern advances in science spring from the roots which first flowered so spectacularly in the seventeenth century, and modern advances in the interrelation of science and economic change (such as automatic controls) spring from that other first flowering which was the industrial revolution.

But, of course, it had aspects other than the technical. Professor Ashton has said of it that " the changes were not merely ' industrial ' but also social and intellectual ", and has justified his use of the term by noting that it " has been used by a long line of historians and has become so firmly embedded in common speech that it would be pedantic to offer a substitute ".[2] And to keep it firmly embedded in common speech and give it a meaning which it deserves we should retain for it the significance which it was given by the earlier writers: by Porter,[3] for instance, writing in economic and technical terms of changes radically affecting not simply industry but the country's whole economy, its social structure and its modes of thought and action. The term should not be applied to certain technical or economic innovations in particular industries which either maintain or increase the growth rate, nor can we deduce an industrial revolution simply from observing the existence in the appropriate figures of an increase in the growth rate of several industries. It is necessary to go beyond the curves of industrial growth and beyond mere mechanisation to the vital conjuncture of changes in which population growth, large-scale and extensive industrial investment, and the remarkably pervasive effects of the application of science to industry are amongst the most important in producing the rapidly cumulative process of industrialisation.

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[1] H. L. Beales, " Historical Revisions: The Industrial Revolution ", in *History*, n.s. Vol. 14 (1929), pp. 125–29.

[2] T. S. Ashton, *The Industrial Revolution*, London, 1948, p. 2.

[3] G. R. Porter, *The Progress of the Nation*, London, 1851.

This use of the term—the third of those mentioned earlier—as well as conforming to the classical English industrial revolution, would at the same time approximately conform to the process sometimes now called, as by Professor Rostow, the " take-off " into industrialisation.[1] In this usage we avoid the danger of equating industrialisation itself with industrial revolution, but reserve it for the initial and—in the long focus of history—comparatively sudden and violent change which launches the industrialised society into being, transforming that society in a way which none of the earlier so-called industrial revolutions ever did. At the same time we are retaining for the industrial revolution its uniqueness in the history of a country, but allowing its extension to others, as for instance in the conception of the Japanese industrial revolution, begun in the 1860s.

In this way, it should perhaps be possible to avoid depriving the term of its meaning, to avoid the path which at present seems to lead to the pointless notion of an economic history in which the absence of an " industrial revolution " will soon be more significant than its presence. The qualitative changes wrought upon a society by the true industrial revolution would thus be emphasised. Though economic history may lean heavily on quantitative determinations, no amount of study of growth curves or the like will be adequate without searching examination of the technical, social, and economic problems which lie behind them.

The London School of Economics.

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[1] *Op. cit.*, p. 102.

APPENDIX

STATISTICAL SOURCES

The sources of the figures from which the graphs were made were as follows:

FIG. 1. The main source for the production curve was the printed returns in *B.P.P.* 1857, Vol. IV, supplemented by original compilations in the Library and Archives of H.M. Customs and Excise, London, especially those in the volume entitled " Quantities, Rates and Amounts of Excise Duties 1684–1798 " and the evidence contained in the long series of letter books covering the correspondence in the eighteenth and early nineteenth centuries between the Commissioners of the Treasury and the Excise.

I am grateful to the Commissioners of the Customs and Excise for permission to consult these Records, and to the Librarian, Mr. R. C. Jarvis, and his staff for their co-operation in facilitating my work there.

For various reasons the printed returns before 1781 were unacceptable and further calculations became necessary in order to obtain figures even approaching reliability. The unreliability is apparent when the printed returns are compared with the amounts collected as revenue, with other series of the same sort, with other information known about the industry, and, above all, with the level to which these figures suddenly jump after the reorganisation in the method of assessment which took place in 1781. This was primarily due to the fact that an increasingly large proportion of paper was charged *ad valorem*, instead of at one or another of a small number of specific rates for specified types of paper. This, in turn, was partly because a range of new types of paper was being made and partly because, with the exception of certain of the lower quality papers, it was advantageous to paper makers to persuade the Excise officials to rate paper *ad valorem*. It is clear from the records of the Customs and Excise that not only was this done, but also that such papers were also generally undervalued. Amongst these records there are annual figures for this period of the value of paper rated *ad valorem*. The problem was therefore to find some factor with which to turn values into physical quantities and thus to obtain estimates of total production.

The following calculations designed to solve this problem were largely carried out by Mr. S. T. David to whom I am greatly indebted not only for this assistance but for his generous advice on statistical matters.

It was assumed that the printed Excise returns for the period 1785–1855 were tolerably reliable or at any rate consistent throughout. It was observed that the curve of the annual values of paper rated *ad valorem* showed, from 1740 onwards (before 1740 it was virtually stationary), the same rate of growth as that of the 1785–1855 curve. By fitting exponential curves to these latter figures and also to the *ad valorem* figures, and obtaining the closest fit for the latter over the period 1740–85, a factor was obtained, working out at rather over 2s. per ream, a low but feasible figure considering the general undervaluation. The curve of estimated total production shows a course of development conforming to that suggested by other evidence including some calculations made by the Board of Excise in 1785. Final figures in tons were thus obtained from the following formula:

$$\left[\text{Amount of paper charged in reams} + 2\ (\text{amount of paper charged in bundles}) \times 9{\cdot}712\ (\text{value of paper charged } \textit{ad valorem} \text{ in £'s})\right] \times \frac{20}{2240}$$

1 bundle = 2 reams (as stated in 10 Anne C. 18, imposing the duties);
1 ream = 20 lb. (an average figure calculated for this period from various sources).

After 1781 the sources were as follows:

1782–1799—*B.P.P.* 1857, Vol. IV (England);
1800–1855—*B.P.P.* 1857, Vol. IV (U.K.);
1856–1859—*B.P.P.* 1860, Vol. XL (U.K.);
1860 —A. D. Spicer, *The Paper Trade*, London, 1907, App. IX.

Before 1800 all figures cover paper only; thereafter they include pasteboard, cardboard, etc.

The import curve was derived from figures taken from the following sources:

1725–1799—*P.R.O.*, Customs 3 (London & Outports);
1780–1789—*P.R.O.*, Customs 17 (London & Outports);
1790–1808—*P.R.O.*, Customs 17 (England, Wales & Scotland) (Scottish imports about 8 per cent. of English);
1809 —*P.R.O.*, Customs 4 (England & Wales)
1810–1830—*P.R.O.*, Customs 5 (England, Wales & Scotland);
1831–1860—Appendix 3 to Select Committee on Paper (Export of Rags) *B.P.P.* 1861, Vol. XI (U.K.).

FIG. 2. Production figures derived from the following:

1800–1860	As above.
1861–1903	Spicer, *op. cit.*, Appendix IX.
1908–1911 1913 1920–1923 1925–1929 1931–1933 1936–1937	London and Cambridge Economic Service Annual Index of Production, Gp. VIII (Paper). The figures given there covering paper made from imported pulp and esparto only were adjusted by comparison with Census of Production figures to obtain estimates of total production.
1907 1912 1924 1930 1934 1935	U.K. Census of Production (3rd, 4th and 5th).
1904–1906 1914–1919 1938–1939	Calculated from imports of pulp and esparto in the same manner as the London and Cambridge figures (see London and Cambridge Economic Service Special Memorandum No. 8, p. 28) and then adjusted as before to cover total production.
1940–1951	Annual Abstracts of Statistics.

Figures for imports of paper-making materials from:

1800–1860—As above.
1861–1905—Spicer, *op. cit.*, Appendix I (from U.K. trade returns).
1906–1951—U.K. trade returns.

FIG. 3. As for Figs. 1 and 2.

FIG. 4. As for Fig. 1 and Spicer, *op. cit.*, Appendix IV.

Marshall's Demand Curve

By R. F. G. Alford

INTRODUCTION

There is at present disagreement over a number of matters relating to Marshall's demand curve. The most important of these differences date from a few years ago, when an interpretation was suggested by Profesor Friedman[1] which was radically different from the traditional interpretation; he was followed shortly afterwards by Professor Stigler with an interpretation which was very near the traditional one.[2] The definitions used in these three interpretations are outlined in Part I of this paper, which brings out the points at issue. Part II sets out an approach to Marshall's demand curve through the role of the marginal utility of money. Part III deals with the interpretation of some key passages in Marshall and concludes by putting forward an interpretation the same in all essentials as that suggested by Professor Stigler, and closely related to the traditional one. In the light of this, Part IV considers certain aspects of Professor Friedman's interpretation.

PART I

THREE DEFINITIONS

If the price of a commodity varies a price-quantity relation will emerge, but for this to be significant some restriction must be placed upon what may happen elsewhere, and the content of this restrictive clause influences the price-quantity relation or demand curve. The restrictive clause must deal with the three major factors influencing the demand curve—tastes, money income and all other prices. Each of the three interpretations we have to consider uses a different definition but they agree that Marshall held tastes and money income constant and differ only in their interpretation of his treatment of all other prices.

When considering the demand curve for a commodity x we can divide all prices into three groups: the first contains only the price of x which must be able to vary; the second contains the prices of the commodities (if any) related to x, and all definitions agree that Marshall held these individually constant; the third group contains the prices of all remaining commodities. It is over the treatment of this third group that the definitions differ.

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[1] " The Marshallian Demand Curve ", *Journal of Political Economy*, 1949, pp. 463–495. Professor Friedman was kind enough to comment on an earlier version of the present paper, but was unable to agree with many of the points made in it. This paper owes much to Professor Friedman's article.

[2] " The Development of Utility Theory ", *Journal of Political Economy*, 1950, pp. 388–90.

The traditional and previously undisputed definition, which we shall call the current definition, assumes he treated these remaining prices in the same way as the prices of related commodities. Indeed, the two groups are not distinguished and all prices other than the price of x are held individually constant. Professor Friedman's radically new interpretation of Marshall uses a definition which treats the third group in index number form and which requires the index to move so that it counterbalances the change in the price of x, thus keeping the purchasing power of money constant and an ordinary cost of living index unchanged along the demand curve.[1] The third definition also interprets Marshall as treating the third group of prices in index number form, but as holding this index number constant along the demand curve; this is therefore a less restrictive version of the current definition. Since all three hold money income constant, one important difference between the current and third definitions on the one hand and the alternative definition on the other is that with the former pair the purchasing power of money, and therefore real income, must vary along the demand curve to some degree at least, while for the latter constancy of the purchasing power of money, and therefore of real income, is postulated for all points on the demand curve.

The evidence in Marshall's writings which throws light on this area of disagreement concerns the behaviour of the purchasing power of money along the demand curve, the influence on this (if any) of the proportion of the consumer's income spent on the commodity and the scope of the assumption that this proportion is small (which he also deals with in terms of the behaviour of the marginal utility of money along the demand curve). In Part II, therefore, some of the important general relationships between these elements and the definitions used are set out, particular emphasis being laid on the current and third definitions.

PART II

MONETARY THEORY AND DEMAND THEORY

The important relationships which lie behind Marshall's demand analysis can be stated fairly simply. Here they are also given in the form of equations and identities as these are more succinct and are sometimes easier to follow.

In *Money, Credit and Commerce*, pp. 43–45, Marshall takes an individual's equilibrium holding of money to be that which gives him ready command over a certain desired proportion of real income:[2]

$$\frac{M}{P} = k\frac{Ym}{P} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

---

[1] Friedman, *loc. cit.*, p. 465; it was called by him the alternative interpretation. He gives a second version of this definition as well, but that mentioned above (which we shall call the first version) is the one he believes Marshall used in the text of the *Principles* and it is therefore the one we shall concentrate on here.

[2] It is known that Marshall had developed this approach as early as 1871. See J. M. Keynes, *Essays in Biography*, p. 164.

Here M is the individual's equilibrium holding of money which, deflated by a price index (P)[1], is a real magnitude equal to a certain desired proportion (k) of real income, shown as money income (Ym) deflated by the same price index. We shall assume for the moment that k is a constant. We shall also define k', which is analogous to k except that it gives the individual's actual, as opposed to his desired, position:

$$\frac{M}{P}=k'\,\frac{Ym}{P} \quad\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(1a)}$$

Thus in equilibrium $k=k'$ and all money income is spent; we shall assume for convenience that all expenditure is on current consumption goods.

In Note 11 of the Mathematical Appendix to the *Principles*[2] Marshall gives the equilibrium condition for the consumption of any commodity x as the equality between the marginal utility of x (ux) and the price of x (px) multiplied by the marginal utility of money (um):

$$ux=px\,.\,um \quad\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(2)}$$

Taken across all commodities consumed this gives us the familiar equilibrium condition:

$$\frac{ux}{px}=\frac{uy}{py}\,\ldots=\frac{un}{pn}=um \quad\ldots\ldots\ldots\ldots\ldots\text{(2a)}$$

In this Note um is stated to be an inverse function of money income (" his means ").

Assuming the marginal utility of each commodity to be a function only of the quantity of that commodity, the fall in um when money income rises must raise qx, given px, as shown in equation (2). This increase in expenditure on x will be paralleled by an increase in expenditure on all other commodities also, and in order to maintain the monetary equilibrium shown in equation (1) this total increase in expenditure must ultimately equal the rise in income. In this way um varies so as to maintain equation (1) and at the same time acts as the proportionality factor between the marginal utility and the price of each commodity so as to maximise the utility derived from the expenditure of income. If this is generalised so that um always reconciles equations (1) and (2a), it follows that um will generally alter if tastes or prices alter. This leads to equation (3) where um is shown as the dependent variable which maintains the equality of k' and k (or of income and expenditure) by varying until $\frac{k'}{k}=1$:

$$um=f_1\left(\frac{k'}{k}\right) \quad\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(3)}$$

---

[1] We shall take P (and its reciprocal, the purchasing power of money) to relate to the sector of the economy under consideration. To assume that the measure for any sector approximates closely to the measure for the economy as a whole and then to use the latter reduces to the same thing. There seems no reasonable alternative to this approach, since otherwise any statement about the behaviour of the purchasing power of money along the demand curve has no significance. For Marshall's comments on measurement of the purchasing power of money, see Pigou (ed.), *Memorials of Alfred Marshall*, p. 207 *et seq.*

[2] Eighth edition (1920), p. 838, and first edition (1890), p. 737. In the latter this note is numbered III, in all other editions it is numbered II. All unqualified references to the *Principles* are to the eighth edition (1920).

It was assumed above that *ux* was a function of *qx* only. Taking any two commodities *x* and *y* this is a limiting case where *ux* is independent of *qy* and *uy* of *qx*. We shall refer to such cases as those where the consumer's utility function is additive. Interdependence of *ux* and *qy*, and *uy* and *qx*, shows commodity interrelations—complementarity or substitutability (which may also involve superiority and inferiority) between *x* and *y*. We shall refer to such cases as those where the consumer's utility function is general.[1] The factors determining *ux* under an additive and a general utility function are shown in equations (4) and (5) respectively.

Diagram 1.

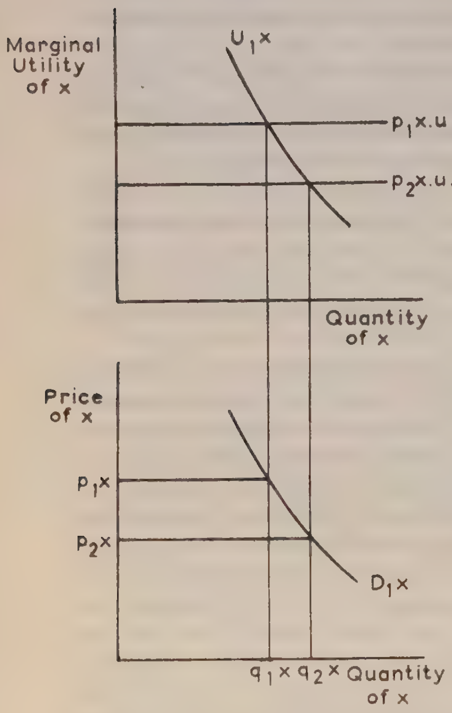
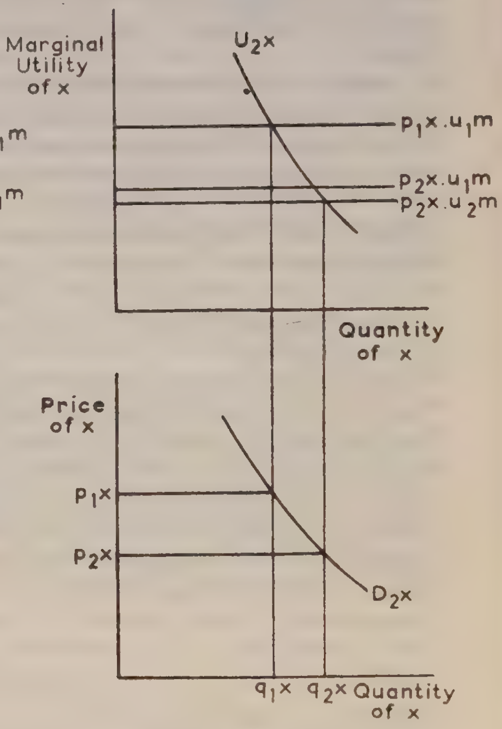


Diagram 2.



$$ux = f_2(qx) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$$ux = f_3(q1, \ldots qx, qy \ldots qn) \ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Utility Curves and Demand Curves

Using the above system, the relationship between an individual's marginal utility curves and his demand curves, and the behaviour of

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[1] The general utility function in a wider sense includes the additive function as a special case; here, however, they are treated as mutually exclusive classes which together include all possible cases. Additive and general utility functions are, of course, ways of describing different situations, and the choice between them must depend upon a judgment of the facts in any particular case.

um can be very easily worked out using only simple logic and the elasticity concept; for clarity these cases are illustrated with diagrams. The demand curves dealt with will be constructed according to the current or third definitions, unless otherwise stated; the more restrictive of these will be used for simplicity when considering effects on expenditure on other commodities.

In diagram 1, x is unimportant to the individual in question and his utility function is additive so that U_1x, the marginal utility curve of x, is given. Taking two prices, p_1x and p_2x, two points on his demand curve are found by multiplying each price by the marginal utility of money u_1m, which we assume virtually constant as x is unimportant. Then where $u_1x = p_1x.\ u_1m$ and $u_1x = p_2x.\ u_1m$ are found the respective quantities q_1x and q_2x, giving two points on the demand curve D_1x.[1]

In diagram 2 the utility function is additive and the commodity is important. Starting from the given point where $u_2x = p_1x.\ u_1m$, since eU_2x [2] is less than unity the change from p_1x to p_2x would reduce total expenditure if *um* remained constant, and *um* must therefore fall. This fall in *um* causes the *qx* relating to p_2x to be greater than it would otherwise have been, thus reducing the fall in expenditure on x, and at the same time causes all other demand curves to shift to the right thus increasing the expenditure on all other commodities. In the new equilibrium the combination of these effects will maintain total expenditure constant and equal to income, determining the new level of *um* at u_2m; the *qx* relating to p_2x is found where $u_2x = p_2x \, . \, u_2m$, giving a second point on D_2x.

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[1] We shall follow Marshall throughout in assuming that price changes are relatively small—" For, as a general rule, the price of a commodity fluctuates within but narrow limits; . . . " (*Principles*, p. 114, and first edition (1890), p. 174n). See also *op. cit.*, p. 133n and third edition (1895), p. 209n. Here p_1x and p_2x are assumed to be within this normal range of price fluctuation. Any commodity x will be termed unimportant if it fulfils Marshall's condition that expenditure on x takes only a small proportion of the consumer's income so that the effect on *um* to him is negligible for fluctuations in *px* within the normal range (that is, $\frac{\triangle um}{um} \div \frac{\triangle px}{px}$ is very small). This term " negligible change " is used as synonymous with the different terms used by Marshall in direct connection with *um* or in indirect connection with it through consumers' surplus, and which appear in quotations 3 and 5 and in footnote 3, p. 39. It also means the same as " virtually constant "—if a magnitude undergoes a negligible change the magnitude remains virtually constant. This usage is extended below to cover other changes which appear to be of comparable insignificance. Taking all commodities other than x together as a composite commodity o, the negligibility of changes in *um* requires not only that changes in *px* are normal and that x is unimportant, but also that the elasticity of *Uo* is not very low; this will be assumed to be the case unless otherwise stated. See below, pp. 28–29 and 33. An alternative way of deriving *Dx* over the normal price range could give a significantly different result. This could be the case if the consumer was discriminated against perfectly for all units of x up to the number which brings his marginal demand price down to the lower level of the normal range of *px*, because then the change in *um* could be much greater than it would be for movements of *px* within the normal range. If the change in *um* caused by the discriminatory process is within the limit of negligibility stated above (in relation to *um* for *px* within the normal range and reached without any discriminatory process), then the relevant range of *Dx* may be taken to be virtually the same irrespective of the way in which it is derived. If this is the case we shall term the commodity in question a strictly unimportant one.

[2] *eUx* stands for the elasticity of the relevant range of *Ux*; here eU_2x refers to U_2x. Similarly, *eDx* is used below to stand for the elasticity of the relevant range of *Dx*, the demand curve for x.

The effect on any other commodity of this fall in *um* is shown in diagram 4 where the change in *um* has been scaled up for clarity. There a fall from u_1m to u_3m causes a shift to the right in the demand curve from D_1y_1 to D_1y_3 which, given *py*, raises the expenditure on this commodity.

Diagram 3.

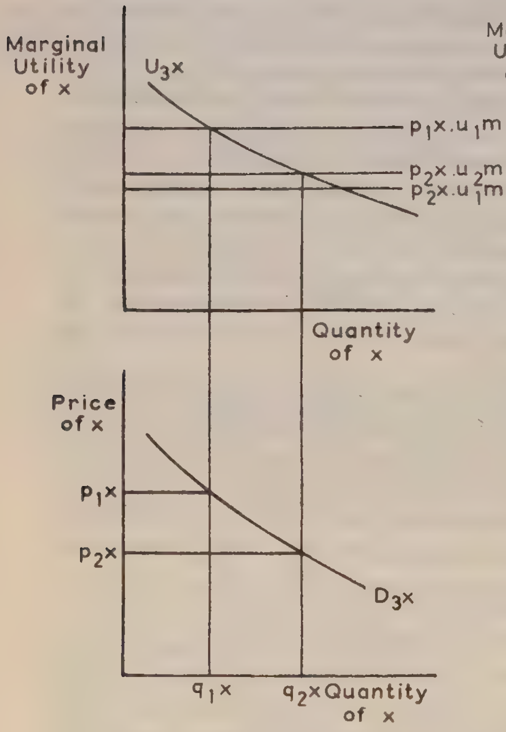

Diagram 4.

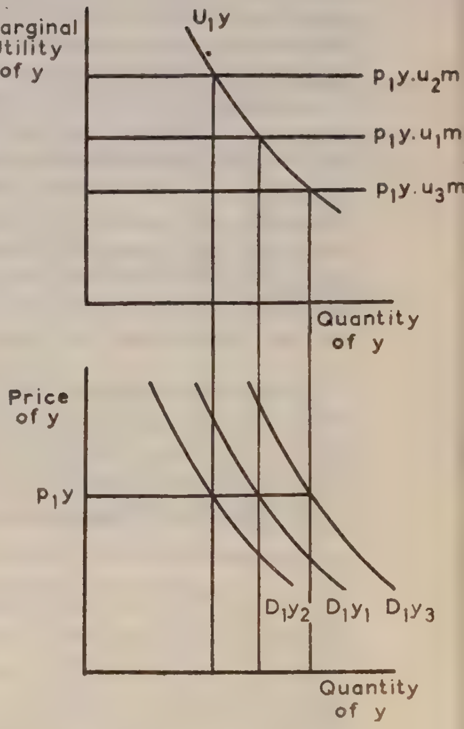

Diagram 3 shows a similar case to that in diagram 2 except that $eU_3x > 1$, so that a fall in *px* would, given *um*, raise total expenditure. For the new equilibrium therefore *um* must rise, modifying the rise in expenditure on *x* and reducing expenditure on all other commodities. The effect on commodity *y* in diagram 4 is to shift the demand curve to the left to D_1y_2.

If $eUx = 1$, a change in *px*, given *um*, will not alter total expenditure, so that *um* will be at the same level for the new equilibrium and *eDx* will equal 1.

It was mentioned in footnote 1, p. 27 that there was an implied condition that *eUo* must not be very low if changes in *um* are to be negligible following a change in px where x is unimportant. This can be shown quite simply; again the consumers' utility function is taken to be additive and for a start the degree of unimportance of x can be unrestricted. In diagram 5 eUo and eUx are both greater than 0 so that outlay on each rises as um falls, given po and px. Since in equilibrium the consumers' expenditure $(poqo+pxqx)$ must be equal to his income (which is given as Ym), the equilibrium level of um must be determined at u_1m. If $eUx<1$ and px rises or if $eUx>1$ and px falls then total outlay on x will rise for any given level of um; this is shown by $pxqx'$. With the change in px which takes the consumer on to $pxqx'$ the equilibrium level of um must rise to u_2m. If $eUo=0$ then no change in um can alter $poqo$, as shown in diagram 6, and in consequence um must change so as to maintain outlay on x constant and equal to $Ym - poqo$ as px changes. It is clear from a comparison of diagrams 5 and 6 that given eUx (which cannot be equal to 1, since in that case $pxqx$ would be identical with $pxqx'$) the change in the equilibrium level of um, following a change in px, will be the greater the lower is eUo. The limits to these changes in um in the extreme case of $eUo=0$ are shown in diagram 7. Here eDx must equal 1 so that outlay on x is constant for changes in px. If the relevant Ux curve is U_1x where $eU_1x=1$, then um will be constant for a change in px. But if Ux is elastic (as U_3x is) then um must fall to u_3m when px rises to p_2x, and as eUx approaches infinity this relative fall in um will approach the relative rise in px, and $p_2x \,.\, u_3m$ will approach $p_1x \,.\, u_1m$. If Ux is inelastic (as U_2x is) then um will rise for its new equilibrium level and as eU_2x approaches 0 the relative change in um will approach infinity.[1] Therefore if $eUo=0$, the relative change in um depends upon the change in px and upon eUx irrespective of the importance of x. But it will be seen that if the relative change in um is to be very small relative to the change in px then, ignoring extreme values of eUx and with $eUo>0$, the higher is eUo the greater can outlay on x be with x still unimportant as defined in footnote 1, p. 27.

At the other extreme, if $eUo=\propto$ and given po, then um must be constant, so that for changes in px both um and Ux are given. Ignoring those high values of px where $qx=0$, outlay on x is determined by px and Ux, and $eUx=eDx$. Over this range of values of px, expenditure on o is determined by money income and expenditure on x.

The only case Marshall deals with in any detail which involves a general utility function is the Giffen case which relates to the inferior member of a pair of substitutes. He does not define the substitute or inferior commodity relationship but we shall take the former as

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[1] If we assume that the consumer will spend his income whatever its size, it follows that the respective limiting relative changes in um for a *fall* in px are a rise of the magnitude of the relative fall in px and a fall in um approaching 100 per cent. It is reasonable to assume that ultimately not all of any rise in money income will be spent on x, and this is equivalent to saying that given po, as um falls eUo will ultimately be greater than 0.

Diagram 5.

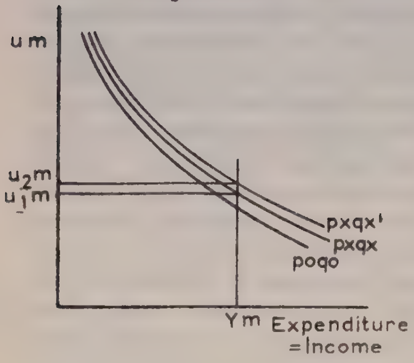


Diagram 6.

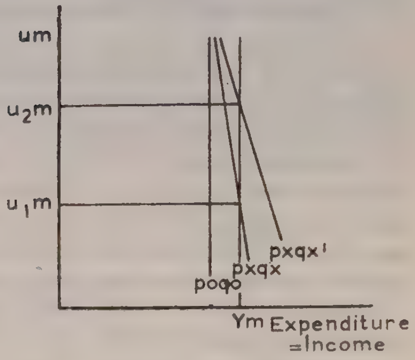
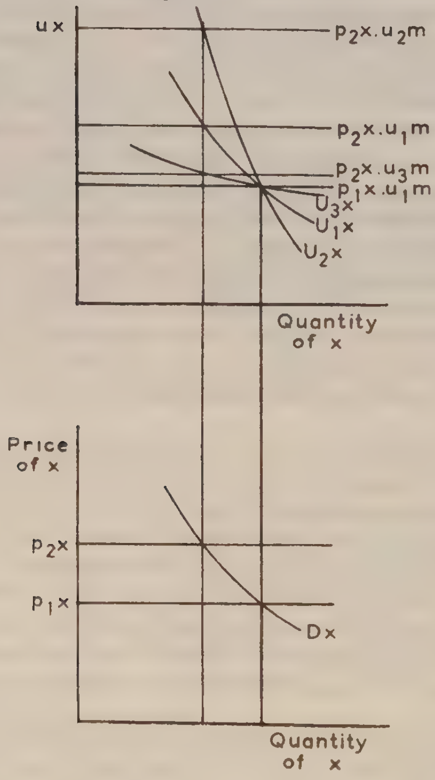
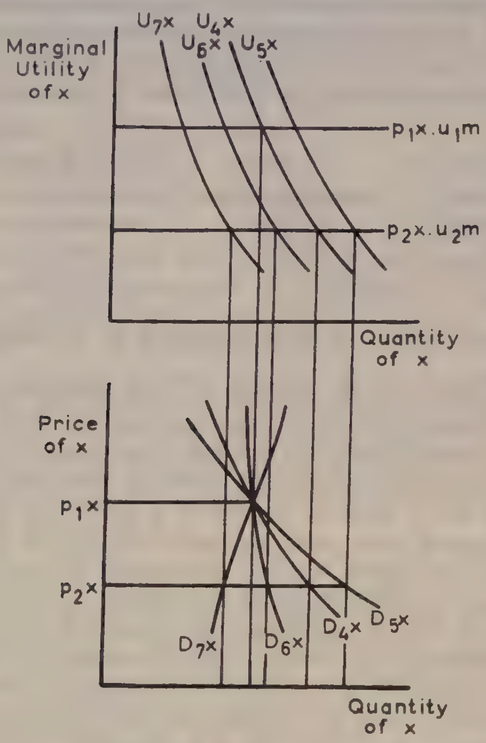


Diagram 7.



existing if, for two commodities x and y, a rise in qx lowers the uy function and a fall in qy raises the ux function. Then if px falls the ux function shifts upwards and the uy function shifts downwards. For the latter we take x to be inferior if a rise in real income shifts the ux function downwards to such a degree that qx falls as money income rises. In diagram 8 three possible cases are shown of what can happen to one of a pair of substitutes when its price changes, and the additive utility function case is included for comparison.[1] In all cases u_2m is assumed to be the equilibrium level of um in relation to p_2x. Starting from p_1x and an equilibrium where $u_4x=p_1x\,.\,u_1m$, a fall to p_2x would, with no inferiority or superiority, cause ux to shift from u_4x to u_5x so that the demand curve would be D_5x. However, if x is inferior and important, the induced rise in real income will have a counter-influence on the ux function which may result in a smaller net shift to the right or can cause a net shift to the left, as with u_6x and u_7x. These differ

Diagram 8.



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[1] The treatment in diagram 8 is for purposes of exposition only. In the case of a general utility function, u_4x, for example, is only significant at the point where $u_4x=P_1x\cdot u_1m$, the rest of the function having no significance unless inferiority-superiority relationships are excluded, when it would be significant in relation to changes in money income. The simplicity of the Ux, Dx and um inter-relationship which exists with an additive utility function is lost with a general utility function.

only in the degree of inferiority they show, but with u_7x the degree is so high that the demand curve D_7x has a positive slope over a range of prices; this is the Giffen case.[1]

Diagram 4 has already been used to show the effects on Dy of a change in px where x is important, so that um varies. It shows equally the effects on Dy of a change in money income, when um must move inversely to the income change.

The following table shows the relationship between the importance of x, eUx, real income (Yr) and the purchasing power of money (PPM) for movements along Dx constructed according to the current or third definition and using an additive utility function; it related to the effects of a fall in px, but all effects are symmetrical for a price rise.

TABLE 1

x	eUx	um	Yr and PPM
1. unimportant	$\gtrless 1$	virtually constant	virtually constant
2. unimportant	$=1$	constant	virtually constant
3. important	$=1$	constant	rises
4. important	>1	rises	rises
5. important	<1	falls	rises

Only in cases 2 and 3 is strict constancy of um consistent with a change in px.

So far we have used the current or third definition to construct our demand curves. But it will be useful also to note briefly some relationships between changes in um and in real income for movements along demand curves based on the alternative definition in the case of an additive utility function and where x is important. In the first version[2] we treat all other commodities (which with an additive utility function cannot be related to x) as a composite commodity o. With a change in px, um will alter unless the changes in outlay on x and o are equal and of opposite sign given um and this requires a particular relationship between eUx and eUo. For the second version it is more convenient to deal with this relationship in another way; the money income variation to keep um constant as px changes must equal the change in outlay on x. This allows qx to change but keeps qo constant so that if um is to be constant along Dx, real income must vary unless eUx is equal to zero. It can therefore be said that if x is important, constancy of um along Dx based on the alternative definition is very unlikely, since in the first version this requires a particular relationship between eUx and eUo and in the second that $eUx = 0$; also considerable changes in um cannot be ruled out. If x is unimportant the variation in um will be very small and we get a case which approximates to case 1 above. The implications of a move along demand curves constructed according to the first version of the alternative definition and the third definition can be conveniently set out as follows:

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[1] In our illustration of the Giffen case we have used a fall in price; Marshall in his account (*Principles*, p. 132) uses a price rise. In this context Marshall does associate a rise in um with a fall in real income following a price change, but as has been shown above for an additive utility function, this is not necessary. This association, however, may point to the association of significant changes in um with significant changes in real income in Marshall's mind (excluding the special case of $eDx = 1$) and this may indicate that negligibility of changes in um along Dx is associated with negligibility of changes in real income and therefore with negligibility of changes in the purchasing power of money. In the absence of any other indication this will be assumed to be so.

[2] The first version of the alternative definition is that in which a change in the index of all other prices keeps the purchasing power of money and therefore real income constant along the demand curve. In the second version a compensating variation in money income keeps real income constant along the demand curve given the index of all other prices.

TABLE 2

	x	PPM	um
Alternative definition (first version)	unimportant	constant	varies negligibly
	important	constant	varies
Third definition	unimportant	varies negligibly	varies negligibly
	important	varies	varies

Here we include only what are likely to be the commonest effects on um, ignoring the rather improbable cases where it is constant or where it varies negligibly when x is important because a particular relationship holds between eUx and eUo or because eUx is equal to or approaches 1. This is consistent with Marshall's treatment of elasticities (*Principles*, pp. 103–108) which gives no weight to the particular values of elasticities required by these cases; also this part of the *Principles* reveals nothing that might point to Marshall's belief in the likelihood of extreme values of eUo so that no practical importance need be attached to such cases.

The negligible variation in um along Dx is of most importance for Marshall in relation to consumers' surplus.[1] His chief concern was with small changes in the consumers' surplus derived from any one commodity,[2] although he deals with total consumers' surplus in his account of this concept in the *Principles.* In dealing with total consumers' surplus he seems to have assumed strict unimportance for convenience, in which case for commodity x, eUx and eDx will be approximately the same for any qx. A change in px leading to a change in consumers' surplus as shown by the area under Dx will then be accompanied by a change in the area under Ux such that the relative changes in each area will be approximately the same, and the actual change in the area under Ux will approximate to the change in the area under Dx multiplied by the original level of um. If x is only ordinarily unimportant this latter approximation will still hold, but the former will not. Thus it appears that for the situation which Marshall saw as important, the money measure of any change in consumers' surplus gives a close indication of the individual's actual gain or loss of utility from the commodity in question. The unimportance of x as a condition for the negligibility of the effects of any change in um when px changes is explicitly mentioned by him in connection with possible effects on the consumers' surplus derived from other commodities (treated here as a composite commodity o). A change in px affecting um will cause some change in the area under Uo and some shift in Do. The relative change in the consumers' surplus from o will be small where x is unimportant and it is clear that in Marshall's view this change in the consumers' surplus from o was taken to be small also relative to the change in the consumers' surplus from x.[1]

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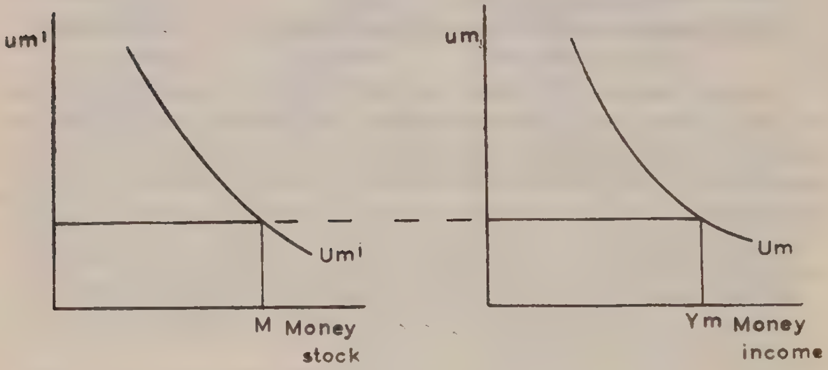
[1] For simplicity we shall refer to consumers' surplus (the concept) all through, although consumer's surplus (a particular measure for an individual) might be more correct in places. Marshall's usage varies through the editions of the *Principles.*

[2] *Op. cit.*, p. 133n and first edition (1890), p. 178 in the footnote continued from the previous page.

Diagram 9.



THE MARGINAL UTILITY OF MONEY, *M* AND *k*

At the beginning of the last section we were concerned with the effects of changes in px and money income on um and qx. In studying these relationships the assumption of a constant k made in equation 1 is not misleading, since any effects induced in k by such changes can only affect the time path of adjustment and not the final outcome. But something can be said about the factors which determine k and the way they fit into the system of relationships set out above. We can define two distinct concepts of the marginal utility of money, that related to an individual's money stock (um') and that related to his money income flow (um). These will be equal in equilibrium, but in disequilibrium um' must be seen as regulating expenditure (as in equations 2 and 2a above) while um gives the equilibrium level to which um' tends to move. Taking um first, we can define a curve Um relating um to money income given the individual's pattern of utility curves and all prices; this curve will slope downwards to the right.[2] For um'

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[1] *Op. cit.*, p. 842, given as quotation 3 below.

[2] The Um curve is illustrated in diagram 9 and in diagrams 5 and 6 where it is shown by the curves labelled $pxqx$ or $pxqx'$, depending on px. This shows that the Um curve shifts when px changes if $eUx \neq 1$.

we can define a curve Um' which relates his actual money stock M to um'. This curve will also presumably slope down to the right and takes as given the individual's tastes concerning the convenience and security yielded by M (thus taking as given this individual's state of confidence), the alternative channels for borrowing money or raising money by selling assets (both of which act as second-line substitutes for money), the particular real or monetary returns available to him by investing some part of M in real assets, and the rate of interest.[1] Taking a change in money income as an example, and holding constant all the factors mentioned above as lying behind the Um and Um' curves, the original level of M will no longer be an equilibrium level, but um' related to that level will still regulate expenditure. Thus the rise in income flows initially into M, lowering um' and raising expenditure until um' equals um, money income equals money expenditure and M is constant at its new equilibrium level.[2] From equation 1 above it follows that in equilibrium $k=\frac{Ym}{M}$, so that for an individual k will be constant if, for changes in money income, $eUm=eUm'$ over the relevant range of values of um. For changes in px, k will be constant if $eUx=1$ where the consumers' utility function is additive. Cases can easily be worked out in which the relative change in k will be very small.

The interpretation put forward here of the role played by the marginal utility of money in Marshall's demand theory is the same as Professor Samuelson's interpretation.[3] Professor Samuelson considers the implications of Marshall's assumption of the constancy of um, and while noting that Marshall regarded its constancy as only approximate he follows out the " rigorous implications of assuming this [constancy] exactly; the closer is Marshall's approximation, the more nearly will the results coincide ". Thus taking the pure form of Marshall's assumption to involve rigid constancy of um when any price changes, he shows that, with an additive utility function, this implies $eDx=1$. This same conclusion is arrived at in cases 2 and 3 above where this constancy holds if $eUx=1$, which means that $eDx=1$.[1] But it seems to be misleading to call this " the purest Marshallian case " as Professor Samuelson does. The criterion of negligibility of changes in um given in footnote 1, p, 27, can be satisfied if eUx approaches unity or if x is unimportant. There appears to be no evidence that Marshall relied upon the first condition and every indication that he did rely upon the second; $eDx=1$ may be a pure case, but it is hardly pure Marshall.

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[1] This list is based on *Money, Credit and Commerce*, pp. 43–5 and on Lavington, *The English Capital Market* (third edition 1934), chapter 6. As given here it must be taken as illustrative, and not as exhaustive.

[2] This equilibrium is illustrated in diagram 9. In Note II of the Mathematical Appendix to the *Principles* (pp. 838–9) um is defined as the partial derivative of total utility with respect to " the amount of money or general purchasing power at a person's disposal at any time ". The Note deals with comparative static equilibrium positions and the interpretation of the marginal utility of money here in relation to such positions is entirely consistent with this definition whether we take " the amount of money or general purchasing power " to refer to money income or to money stock. See also first edition (1890), pp. 737–8.

The interpretation put forward here shows the connection between individual liquidity and the um-um' relationship. See Marshall, *op. cit.*, pp. 335–7 and first edition (1890), pp. 392–5, where he deals with temporary equilibrium of supply and demand where the stock of money and goods on hand is given.

[3] " Constancy of the Marginal Utility of Income ", *Studies in Mathematical Economics and Econometrics*, Lange and other editors, pp. 75–91. The treatment by Professor Samuelson is mathematical but the conclusions are summed up neatly at each stage of the argument and these summaries have been relied upon. Here we shall consider only the first (Marshallian) hypothesis and the case of an additive utility function. See also Samuelson, *Foundations of Economic Analysis*, pp. 117–22 and ch. 7.

Professor Friedman does not make any detailed examination of the role played by the marginal utility of money in Marshall's demand theory, but he appears to follow Professor Hicks' interpretation.[2] This, however, treats money as a *numéraire* and appears to have no relationship to the concept of um used by Marshall in the text of the *Principles* and in Note II of the Mathematical Appendix, upon which the interpretation here is based.[3]

PART III

THE EVIDENCE IN MARSHALL

There are great difficulties in the interpretation of many parts of Marshall's writings which relate to his demand curve—for example, the definition he used is largely implicit and the situations he had in mind are seldom clearly indicated. But certain important properties of his demand curve do emerge from his discussion of its characteristics and its applications and these provide more material on which an interpretation can be based.[4] Here it may be recalled that Table 2 showed that demand curves constructed according to the alternative and third

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[1] Professor Samuelson states that Professor Pigou " appears to be in error in his belief that constancy of the marginal utility of income with respect to income implies infinite elasticity of demand ". (Lange, *op. cit.*, p. 85n.) Using an additive utility function, if um is to be constant for a change in money income, the elasticity of the utility function of one commodity must be infinite. This may be at the root of Professor Pigou's belief; however it does not lead to infinite elasticity of demand. Taking the simple case of two commodities only the important equilibrium condition for an individual is:

$$\frac{ux}{px} = um = \frac{uo}{po}.$$

Taking px as variable and po as constant, if $eUx=\infty$ then ux is given. As px changes um must move proportionately in the opposite direction, and qo must alter so as to maintain the second half of the equation. It can be possible for px to fall to a point where uo is associated with zero qo, and for px's below this $eDx=1$, all income being spent on x. But for px's above this eDx depends on eUo, for then po being given, qo is given by um and Uo, and all income not spent on o goes on x giving qx for any px. It follows that if $eUo>0$ then $eDx>1$ and if $eUo=0$ then $eDx=1$. Alternatively, taking $eUo=\infty$ so that uo is given means that um will be constant. Then eDx is equal to eUx (see above, p. 29).

[2] Hicks, *Value and Capital*, second edition, ch. 2. See Friedman, *loc. cit.*, pp. 478–9 and particularly footnote 30. See also footnote 1, p. 40.

[3] See Samuelson, " Constancy of the Marginal Utility of Income ", *Studies in Mathematical Economics and Econometrics*, p. 80.

[4] Friedman, *loc. cit.*, p. 480 *et seq.*, gives a detailed survey of Marshall's writings which throw light on his demand theory. See also Stigler, *loc. cit.*

definitions respectively exhibited differences in the behaviour of the purchasing power of money (and therefore of real income) for movements along the demand curve but no significant difference in the behaviour of *um*.

(1) *Economics of Industry* (*1879*), *pp. 68–69:*

> " If beef becomes scarce, and rises in price, while the prices of all other things remain unchanged, there is a rise in the general purchasing power or value of beef . . . while examining the theory of Normal value we shall, for convenience, assume that the purchasing power of money remains unchanged. So that a rise or fall in the price of a thing will always mean a rise or fall in its general purchasing power or exchange value ".[1]

In the first sentence quoted a rise in the general purchasing power or value of beef is identified with a rise in its price, other prices being constant, and the last sentence seems to imply that a change in price always assumes other prices constant. The statement that the purchasing power of money is assumed constant for convenience seems therefore to turn upon the constancy of all other prices. This appears to mean that constant purchasing power of money is identified with constant other prices, the " for convenience " referring to the convenience of assuming it was constant when in fact some change must have occurred when the price of beef changed, given all other prices. This would imply that beef was unimportant so that the change in the purchasing power of money was very small and could therefore be ignored.[2] Further on, Marshall refers to price as measuring final utility to the consumer, to utility as always referring to some quantity of a commodity and to some particular person (and depending on future opportunities of getting it or substitutes for it) and to demand price as depending not only on utility but also on the consumers' means. He therefore in effect states the current definition and the passages dealt with here may well be the original literary source of this definition.

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[1] The substance of the second part of this quotation is restated elsewhere, *op. cit.*, p. 150. Both quotation 1 and the restatement are unchanged through all editions of the *Economics of Industry* (1879) which was published under the joint names of Alfred and Mary Paley Marshall. For some comments on this book see J. M. Keynes, *Essays in Biography*, pp. 145, 177–8, 333–4. To distinguish it from the *Elements of the Economics of Industry* which first appeared in 1892 with Alfred Marshall as sole author, and which was intended to replace the earlier joint work, the date 1879 has been quoted in the title of the latter throughout this article, although there were in fact three editions (and not a first edition and one revised edition as stated in the bibliography of Marshall's writings in Pigou (ed.), *Memorials of Alfred Marshall*). There were (according to this bibliography) ten printings in all and of these eight are traceable, two of the first edition (Oct. and Nov. 1879), three of the second edition (1881, 1883 and 1884) and three of the third (1885, 1886 and 1888) of which only the 1885 printing is explicitly labelled as third edition. A comparison of the three editions shows that (excluding the preface added to the second edition) the changes in the second and third editions are of a similar order; this seems to warrant treating the third edition as a second revised edition.

[2] See Friedman, *loc. cit.*, p. 484, footnote 44, and footnote 1, p. 32.

(2) *Principles, p. 62:*

> "The price of everything rises and falls from time to time and place to place; and with every such change the purchasing power of money changes so far as that thing goes. If the purchasing power of money rises with regard to some things, and at the same time falls equally with regard to equally important things, its general purchasing . . . has remained stationary. This phrase conceals some difficulties, which we must study later on. But meanwhile we may take it in its popular sense which is sufficiently clear; and we may throughout this volume neglect possible changes in the general purchasing power of money. Thus the price of anything will be taken as representative of its exchange value relatively to things in general, or in other words as representative of its general purchasing power".[1]

The first part of quotation 2 loosely defines the conditions for constancy of the purchasing power of money when there are multiple price changes; since Marshall explicitly assumes constancy of prices of rival commodities[2] the question arises as to whether this constancy of the purchasing power of money refers simply to changes within the third group of prices which are mutually offsetting or whether it refers to a case in which a move along the demand curve for a commodity is under consideration, in which case the price of this commodity could be treated as one of the multiple and offsetting price changes, so that along the demand curve the purchasing power of money was constant. But then the quotation refers to the *neglect* of possible changes in the purchasing power of money;[3] this could be due to some sort of index number considerations (as implied in the reference to difficulties), although this seems unlikely, or it could refer to very small changes due to a change in the price of an unimportant commodity with the offsetting multiple price changes confined to the third group of prices.

The sections of the *Economics of Industry* (1879) and the *Principles* in which quotations 1 and 2 appear show a close relationship, the latter being apparently a revised version of the former. The first sentence of quotation 2 replaces a passage (which fills the hiatus in quotation 1) mentioning the possibility of changes in the purchasing power of money when all prices change together. The first sentence in quotation 2 then appears as a development of this which, instead of mentioning general and excluded price changes, mentions offsetting and permitted ones.[1] The last sentence in each quotation is the culmination of the line of reasoning and these exclude changes in the general purchasing power of money, except, apparently, for very small changes of unspecified origin which can be neglected.[2] Bearing in mind the relationship between the two quotations, the most likely interpretation seems to be that the second represents a change from the current definition to the less restrictive third definition, the multiple and offsetting price changes being within the third group of prices and the changes in the purchasing power of money which are to be neglected being those arising from changes in the price of the unimportant commodity under consideration.

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[1] Quotation 2 undergoes alteration and expansion through the editions of the *Principles*, the chief one for present purposes occurring in the passage which quoted above reads " . . . neglect possible changes in the general purchasing power of money". The passage reached this form in the fifth edition (1907). In the first three editions it read " . . . assume that there is no change in the general purchasing power of money" and in the fourth edition " . . . possible changes in the general purchasing power of money will be neglected". It is argued below (pp.40–41) that these changes do not affect the substance of the quotation, and this is supported by the fact that the important part of the related footnote (mentioned in footnote 3 below) is the same in all editions of the *Principles*.

[2] Marshall, *op. cit.*, p. 100 and first edition (1890), p. 160.

[3] Marshall, *Principles*, p. 62, refers to Cournot's simile between the convenience to economists of assuming the purchasing power of money constant and that to astronomers of assuming a mean sun. See also *ibid.*, p. 593 and first edition (1890), p. 9n.

(3) *Principles, p. 842:*

> " It should be noted that, in the discussion of consumers' surplus, we assume that the marginal utility of money to the individual purchaser is the same throughout. Strictly speaking we ought to take account of the fact that if he spent less on tea, the marginal utility of money to him would be less than it is, and he would get an element of consumers' surplus from buying other things at prices which now yield him no such rent. But these changes in consumers' rent (being of the second order of smallness) may be neglected, on the assumption, which underlies our whole reasoning, that his expenditure on any one thing, as, for instance, tea, is only a small part of his whole expenditure. (Compare Book V, ch. II, §3.)"[3]

(4) *Ibid, p. 95:*

> " The larger the amount of a thing that a person has the less, other things being equal (i.e. the purchasing power of money, and the amount

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[1] This development is less far-fetched than might appear. In the *Economics of Industry* (1879) Marshall goes on to consider causes of changes in the purchasing power of money, and refers to this part of the book in the passage omitted from quotation 1. But he does not deal with changes in the purchasing power of money in the *Principles* as this was to be treated in a later volume, which eventually appeared as *Money, Credit and Commerce* (1923).

[2] It is curious that Professor Friedman (*loc. cit.* p. 483) and Professor Stigler (*loc. cit.*, p. 388) appear to interpret Marshall as holding the purchasing power of money constant when it seems perfectly clear that this is not the case. Professor Friedman also refers to the logical inconsistency between constancy of all other prices and that of the purchasing power of money (*loc. cit.*) while on the following page he allows that there may be no inconsistency if the commodity is unimportant on the grounds that it could be argued that Marshall neglected small changes in the purchasing power of money. Professor Stigler, having the third definition in mind, goes on to identify Marshall's measure of the purchasing power of money with an index which excludes the price of the commodity to which the demand curve refers. He points out that unless the commodity is important or the price change large, the discrepancy between this index and one including all prices will be small. But with similar provisoes the latter index is entirely consistent with Marshall's own statement, making the former unnecessary.

[3] Also *ibid.*, first edition (1890), p. 740, verbal changes only. The following passage appears in the section referred to in parentheses in the quotation: " This assumption [that *um* would be practically the same] is justifiable with regard to most of the market dealings with which we are practically concerned. When a person buys anything for his own consumption, he generally spends on it a small part of his total resources: . . . The exceptions are rare and unimportant in markets for commodities . . . " (*op. cit.*, p. 335 and first edition (1890), pp. 393–4).

> of money at his command being equal), will be the price he will pay for a little more of it: or in other words his marginal demand price for it diminishes . . . we have as yet taken no account of changes in the marginal utility of money, or general purchasing power ".[1]

(5) *Ibid., pp. 131–2:*

> " It will be noted however that the demand prices of each commodity . . . assume that *other things remain equal,* while its price rises to scarcity value: . . . The substance of our argument would not be affected if we took account of the fact that, the more a person spends on anything . . . the greater is the value of money to him (in technical language every fresh expenditure increases the marginal value of money to him) . . . for there are very few practical problems, in which the corrections to be made under this head would be of any importance ".[2]

The relationship between *um* and expenditure on a commodity for moves along the demand curve, and the negligibility of changes in *um* when the commodity is unimportant which were dealt with in Part II are confirmed by quotations 3 and 5. Quotation 3 also makes very clear that to Marshall assuming something did not mean postulating it, nor did it mean that the thing assumed had to hold true; indeed, it meant almost the opposite, as can be seen from the contrast Marshall makes between " assuming " and " strictly speaking ". To Marshall assuming something in the sense in which this is used in quotation 3 meant that deviations from the assumed condition would occur but only to a degree that could be neglected. That this was the sense in which *um* was assumed constant along the demand curve is clear from quotations 3, 4 and 5. It is evidently in this sense also that the purchasing power of money was assumed constant in the version of quotation 2 given in the first three editions of the *Principles*, so that the neglect of possible changes in the purchasing power of money which replaces this in the fourth and subsequent editions represents no change in substance, both meaning that only negligible changes would occur in the situations Marshall had in mind.

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[1] Also second edition (1891), p. 152. The sentence following the quotation states, " At one and the same time, a person's material resources being unchanged, the marginal utility of money to him is a fixed quantity ", so that $\frac{px}{py}=\frac{ux}{uy}$. In the next paragraph the effect on *um* of a change in money income is dealt with and *um* is stated to be an inverse function of money income. The last sentence quoted fairly clearly assumes any change in *um* to be negligible for the example of the derivation of a demand curve which precedes it. The following sentence and the next paragraph is a verbal version of part of Note II in the Mathematical Appendix. In the first edition (1890), p. 155, this following sentence is prefixed by " For . . . ", as if unchanged material resources were the reason why no account had been taken of changes in *um* along the demand curve (see footnote 1, p. 32). However, the account of the effects of changes in money income is prefixed by " But . . . ", so that it appears Marshall (in all editions) was dealing with the case of an unimportant commodity and contrasting the effects of a price change on *um* (which were negligible) with the effects of a change in money income on it (which were not negligible). The criterion of negligibility is taken as that given in footnote 1, p. 27, for the first and a very low value of the parallel elasticity for the second.

[2] Also third edition (1895), pp. 207–8. Quotation 3 above is taken from note VI of the Mathematical Appendix to the *Principles* which refers to the part of the text in which the latter part of quotation 5 appears.

The question now arises as to the scope of the assumption of unimportance, and the passage quoted in footnote 3, p. 39, makes it clear that to Marshall unimportance was the typical case; this statement is quite divorced from any requirements which might be imposed by consumers' surplus, for the passage in question does not mention it; but it does imply that consumers' surplus analysis can be validly used for the vast majority of commodities.

The line of reasoning which seems to give the most consistent interpretation of Marshall now runs as follows—quotations 1 and 2 point to his use of the current definition in the *Economics of Industry* (1879) and the third definition in all editions of the *Principles*, and quotations 2 and 3, in particular, imply that in general *um* and the purchasing power of money varied only negligibly along the demand curve. This requires the commodity to be unimportant and the passage quoted in footnote 3, p. 39, shows that in Marshall's view the unimportant commodity was the typical case. In the third edition (1895) of the *Principles*, the Giffen case was introduced as one example out of a number of possible cases in which *um* was not virtually constant as expenditure on the commodity varied along the demand curve.[1] This implies that the commodity in question was important and that the purchasing power of money varied along the demand curve; the first is confirmed by the text of the *Principles* and the second is required on any view of the case. The fact that the Giffen case was introduced without any modification being made to the substance of quotation 2 (in which changes in the purchasing power of money were in effect stated to be negligible throughout the *Principles*) implies that this quotation referred to the typical case. It appears from this that the first two editions of the *Principles* concentrated on the typical case which Marshall saw as covering the overwhelming majority of actual cases, and the general statements concerning the virtual constancy of *um* and the purchasing power of money were not universal but applied to this typical case; these general statements on the virtual constancy of *um* and the purchasing power of money were therefore consistent with the existence of exceptional cases (for which *um* and the purchasing power of money varied along the demand curve). But these exceptional cases were barely hinted at in that version of the passage given in footnote 3, p. 39, which appeared in the second edition (1891), where their rarity was stressed, and were even more obscured in the first edition (1890). The only relevant change in the third edition (1895) and later editions is the introduction of the Giffen case as an example of an exceptional case. This change in the third edition (1895) seems therefore to be due to a change in the factual material available to Marshall,[1] and not to indicate any change in his definition of a demand curve or in his view as to the typical case. The Giffen case must be taken as an embellishment of what, in Marshall's view, was a turning of very minor importance off the main path followed by the *Principles*.

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[1] Marshall, *op. cit.*, p. 132 and third edition (1895), p. 208. The statement of the Giffen case follows quotation 5 above, and it is clear from its context that its exceptional character is due to the variation in *um*. The case appears in the chapter in which Marshall deals with consumers' surplus for which *um* is assumed virtually constant. Since for the Giffen case *um* varies, such a demand curve cannot be used for consumers' surplus calculations and it is for this reason that such cases are rare and require treatment on their own merits. The Giffen case requires a general utility function to make possible the positive slope of the demand curve which is its most striking feature. But Marshall never altered his belief that the general utility function was " less adapted to express the everyday facts of economic life " than the additive utility function (*op. cit.*, p. 845, and second edition (1891), p. 756). For a discussion of the utility function used by Marshall see Stigler, " The Development of Utility Theory ", *Journal of Political Economy*, 1950, pp. 326–7, 390. It may be noted that Marshall's flexible use of the term commodity raises difficulties concerning the validity of the general assumption of unimportance and of the general assumption that the utility function is additive. Marshall's own view of the validity of this flexible use of the term is ambiguous. For statements implying its validity see Marshall, *op. cit.*, pp. 100n and 390–1, and pp. 131n and 842 for statements implying the reverse. See also p. 105n.

PART IV

THE ALTERNATIVE DEFINITION

So far this paper has been concerned with setting out an interpretation of Marshall, and this has led to the conclusion that he probably used the third definition in all editions of the *Principles*. But it is Professor Friedman's view that Marshall originally used the alternative definition, and he sees evidence for this in Marshall's early writings, in the text of the *Principles*, and, even more definitely, in the Mathematical Appendix. Here we shall consider certain aspects of the case he has put forward.

Any interpretation of Marshall's demand theory must attempt some explanation of why and how the Giffen case came to appear in the third (1895) edition of the *Principles*. The explanation given above suggested that the answer to " why " is that it was due to a change in the factual information available to Marshall and that he evidently thought the new information sufficiently important to include it in the *Principles*; the suggested answer to " how " is that in all editions the *Principles* concentrated upon the typical case but never excluded the possibility of exceptional cases although until the Giffen case appeared no particular cases were explicitly mentioned as being exceptional. In his statement of the case for the alternative definition Professor Friedman gives other tentative answers to these questions; for the first he suggests a change from the alternative definition, which he believes Marshall used exclusively through the first two editions of the *Principles*, to the third definition in the third edition (1895).[1] The main evidence in support of the alternative definition is the treatment of the purchasing power of money, and he believes that the constancy of this was probably the most fundamental of the other things which remained equal along the demand curve.[2] In his view, this constancy was universal through the first two editions, covering cases of important commodities, and the latter were included in the general treatment in the text of the *Principles* (except where explicitly excluded as in the treatment of consumers' surplus, which requires virtual constancy of *um* and is therefore restricted to unimportant commodities). But this explanation based upon the intrusion of the third definition means that in the third and later editions the purchasing power of money must vary along the demand curve in the case of important commodities instead of being constant along it for such cases as it had been previously, and that this radical change occurred while the key statement on the constancy of the purchasing power of money,[3] hitherto of universal coverage and of fundamental importance, remained essentially unchanged. At the same time, the introduction of the Giffen case drew attention to the very point where this inconsistency occurred—the behaviour of the purchasing power of money and real income along the demand curve.

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[1] Marshall evidently thought he was dealing with a factual case, but see Stigler, " Notes on the History of the Giffen Paradox ", *Journal of Political Economy*, 1947, pp. 152–6. See also comment by A. R. Prest and reply by Stigler, *ibid.*, 1948, pp. 58–62. Elsewhere in the *Principles* (p. 106) wheat is used as an example of an exception to the " general law of the variation of elasticity of demand ". It is strange that there was never any cross-reference between this and the Giffen case, which is a far more striking exception to this " law ". In passing, it is interesting to note that this " law " was quite different in the first two editions (see, for example, first edition (1890), p. 163). On the whole, Marshall showed great conservatism in his use of examples as well as apparently striking inconsistency on occasions; compare, for example, his general statements on unimportance and his example of wheat (and his comments on this in the text and the associated footnote) and that of house-room which appears on the following page of the *Principles*. (Both examples appeared in the *Economics of Industry* (1879) on pp. 159 and 161–2 respectively.) See also Stigler, *loc. cit.*, on his later version of the Giffen case. There is also his statement of the universality of the law of demand (*Principles*, p. 102 and first edition (1890), p. 162) which remained unchanged through all editions.

Professor Friedman's explanation of how this change in definition was possible runs in terms of a period of some twenty years (say, 1873 to 1893) during which, so far as demand theory was concerned, Marshall's mind lay fallow and during which the details of his original position (which was built around the alternative definition) became blurred in his mind. This, he believes, made possible Marshall's unconscious switch to the third definition between 1891 and 1895, a period when the current definition (which is simply a variant of the third definition) was in use and could have influenced him.[4] It is probably true that there were no substantive changes in his demand theory for some twenty years before the appearance of the third edition (1895) of the *Principles*, but lack of substantive change is hardly a sound pointer to his losing sight of some precise aspects of it. In fact, Marshall worked on the *Pure Theory of* (*Domestic*) *Values* in 1875–7, on the *Economics of Industry* (1879) in 1877–8, on elasticity and what was to become Book III of the *Principles* in 1881–2, re-cast this for publication in 1886 and worked on the Mathematical Appendix in 1889.[1] This suggests that he went back over his demand theory sufficiently frequently to keep his mind clear on it (even assuming that he had not recorded it for his own reference in a way which would prevent any blurring).

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[1] Friedman, *loc. cit.*, pp. 487–9. He sees the intrusive definition as stemming from the current definition, but here we speak of the third definition as being the intrusive one because for present purposes it can be treated as equivalent to the current one and, as Professor Friedman himself says (*loc. cit.*, p. 483), the latter cannot be found explicitly in Marshall (which must cover the *Principles*, which is all we are concerned with here).

[2] Friedman, *loc. cit.*, p. 484.

[3] See quotation 2 above.

[4] Friedman, *loc. cit.*, pp. 487–9. He suggests that the absence of discussion of any other interpretation implies that Marshall and his followers did not recognise the change which he believes occurred. But it could imply that, as suggested here, there was no change of this sort. This lack of discussion, the implications of Marshall's

Professor Friedman's position, therefore, involves accepting that there was a change in the third edition (1895) of the *Principles* that had effects which were important, and which were glaringly inconsistent both with the earlier editions and with a key passage concerning the behaviour of the purchasing power of money which was carried over unchanged into the third edition, and that Marshall could have been unconscious of this inconsistency. This hardly seems possible, and the hypothesis of a long hiatus, although it could explain a subtle change in definition with only subtle effects, can hardly explain such internal inconsistency as, on Professor Friedman's view, existed in the third edition.[2] Finally, the hypothesis of the hiatus is difficult to reconcile with the facts which are known about Marshall's work.

Note II and the first part of Note VI of the Mathematical Appendix to the *Principles* are cited by Professor Friedman as evidence respectively for the alternative definition and against the third definition.[3] In the first of these Marshall appears to derive a price-quantity relationship by a process of perfect discrimination, so that real income is constant along the resulting demand curve; this has been taken to point to the alternative definition which also gives constant real income along the demand curve. Note II is appended to that part of the *Principles* in which Marshall introduces the demand curve and, with tea as his example, derives it from the marginal utility curve starting from one

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treatment of demand in the *Economics of Industry* (1879) dealt with on p. 37 and (1) above and some of Professor Friedman's statements (*loc. cit.*, p. 483, particularly footnote 42) suggest that parts of the Cambridge oral tradition date from an earlier time and have spread further than might at first be supposed. Also the tradition seems to be far sounder than he believes, although some attempts to find support for parts of it in places in the *Principles* which give no direct support have made the two appear inconsistent.

[1] J. M. Keynes, *Essays in Biography*, pp. 156, 177-80, 187.

[2] Some stress has been laid here on the inconsistencies which arise from Professor Friedman's interpretation because the interpretation put forward here avoids these particular ones, although it could possibly involve others. However, it must be conceded that there are many things in the *Principles* which weaken arguments from consistency; see, for example, footnote 1, p. 20.

[3] Friedman, *loc. cit.*, pp. 486 and 492–5, where he also considers the last part of Note VI.

unit of the commodity, taking no account of changes in *um*; later he uses this same example to derive total consumers' surplus.[1] Since he derives total consumers' surplus for this commodity he must have been treating it as strictly unimportant (see footnote 1, p. 5); he also states that, while for practical applications (consumers' surplus calculations) a section of the demand curve in the neighbourhood of equilibrium is sufficient " . . . it will save trouble to assume provisionally, as in pure theory we are at liberty to do, that the curve is completely drawn ".[2] It therefore seems clear that he made the assumption of strict unimportance for convenience in exposition, and it is quite likely that the mode of deriving a demand curve used in Note II was simply a mathematically convenient approximation, for if the commodity is strictly unimportant the difference between the demand curves constructed on the third definition and by perfect discrimination or on the alternative definition will be negligible. The mode of derivation in Note II does not therefore seem reliable evidence for the alternative definition.

In the first two paragraphs of Note VI, Marshall speaks of the curve $f(x)$ (misprinted as $f(z)$ in one place in later editions) as a demand curve and as being indefinitely great if a (the quantity of x consumed) is less than b, where b is the amount of x necessary for existence. On the third or current definitions this cannot hold, since even if all income is spent on x, $f(x)$ cannot be indefinitely great. Professor Friedman concludes that these two paragraphs support his alternative definition, since with the second version of the alternative definition an income variation to keep real income constant will mean an indefinitely great rise in money income as a falls to b, so that the demand curve can be indefinitely high. But in such a case $a=b$ is a limiting situation, for no demand curve for x can have real income constant along it if $a>b$ at one point and $a<b$ at another where b is the amount of x necessary for existence. Therefore, the alternative definition can only produce a demand curve for $a \geqq b$, while the Note refers to $f(x)$ where $a<b$. The Note assumes that *um* is virtually constant for total consumers' surplus calculations relating to the amount of x in excess of b; this must mean that the commodity is strictly unimportant and that $f(x)$ is not very great where $a>b$; but Professor Friedman speaks of $f(x)$ as approaching infinity as a approaches b. This is inconsistent with the total consumers' surplus calculation for the amount of x in excess of b and is not implied by Marshall; for example, in such a case, a kink in $f(x)$ is very likely so that $f(x)$ is indefinitely great only where $a<b$.

In the first edition (1890) of the *Principles*, p. 178n., Marshall states, " There is, however, a difficulty in estimating the total utility of commodities some supply of which is necessary for life; for instance, the utility of the food required to keep a man from starvation is indefinitely great ". There is then a cross-reference to Note VI in the Mathematical Appendix where the same words " indefinitely great " are used with reference to $f(x)$ where $a < b$, although the cases are not altogether parallel. In the third edition (1895) the quotation given above was dropped from the footnote in the text which contained the cross-reference to Note VI. Further, in the first part of the last paragraph of Note VI Marshall says, " It should be noted that, in the discussion of consumers' surplus, we assume that the marginal utility of money to the individual purchaser is the same throughout ", and this must refer to the first part of the Note itself.

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[1] *Op. cit.*, pp. 94–6 and quotation 4, and pp. 125–7.

[2] *Op. cit.*, p. 133n. Professor Friedman also makes this simplification (*loc. cit.*, p. 478, footnote 27).

These point to the same thing—that Marshall was using $f(x)$ to mean primarily the marginal utility curve but also the demand curve over those ranges of x relevant for consumers' surplus. The first does this by implication. The second is more definite, for if *um* is constant $eUx = eDx$ for any quantity of x, and the two curves are the same so far as Note VI is concerned, and to speak of $f(x)$ as indefinitely great where $a<b$ is correct for the marginal utility curve where $a<b$, and *um* cannot be taken as constant.[1] This interpretation is supported by the quotation given by Professor Friedman from the *Annals of the American Academy of Political and Social Science.*[2]

Besides the evidence based upon his interpretation of the *Principles*, Professor Friedman puts forward a more general argument for the alternative definition. It is that the alternative definition gives a more useful demand curve for the treatment of most economic problems. With constant resources used to a given degree (and given technique), real income can be taken as constant for the economy for any small change in the price of any commodity, because over such a range constant factor use and constant real (utility) income can be taken to coincide. If a demand curve based on the third definition is used in such a situation it will be unstable for price changes because real income varies along it, and since real income is stable in fact the demand curve must shift.[3] This is part of a more general proposition that the stability of a demand curve will depend upon the definition and the situation being dealt with; if the demand curve is stable then the two may be said to match. For example, the demand curve of a small sector of an economy which relates to an unimportant commodity may be taken as stable if based upon a definition which ignores all contingent effects upon *um* and the purchasing power of money following a change in the price of that commodity. But if we consider the demand curve of a large sector of an economy for an important commodity, or the demand curve of an economy for an important imported commodity, such contingent effects need not be negligible, and they may be very complex. Using a definition which takes these effects to be negligible will then give a demand curve which will be unstable. The conclusion is a simple one—the usefulness of a definition (in terms of its yielding a stable demand curve) cannot be considered apart from a situation.

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[1] If consumers' surplus for $a - b$ of the commodity is considered, where $a > b$, a total consumers' surplus calculation implies that the commodity is unimportant where a and not just $a - b$ of it is concerned. The example of food given by Marshall and mentioned above is hardly consistent with this.

[2] Friedman, *loc. cit.*, p. 494.

[3] Friedman, *loc. cit.*, pp. 470–4.

Professor Friedman's general argument for the alternative definition is based upon the usefulness of the demand curve which it yields—implying that it yields a stable demand curve for most of those situations for which it is useful to be able to construct demand curves. But if there is no restriction on the importance of the commodity (and in Professor Friedman's view such a restriction is required only for consumers' surplus which is not relevant here) then this argument applies only to demand curves relating to the economy as a whole. However, Marshall refers to the demand curves of individuals, of rich, middle class and poor groups of consumers, of poorer labouring classes and of the inhabitants of a locality.[1] This concentration on demand curves relating to relatively small sectors of an economy makes Professor Friedman's general argument for the alternative definition largely inconsistent with the use of this definition by Marshall.[2]

The arguments put forward in this paper in support of the third definition are not intended to suggest that it was Marshall's single and universally applicable definition, for it is only in certain situations that it will yield a stable demand curve. But one of those situations—

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[1] Marshall, *op. cit.*, pp. 94–6, 103–4, 132, 104, 107 respectively. All except the third go back to the first edition, and that goes back to the third edition (1895). Marshall seemed to see no particular problem arising from the adding together of demand curves for sectors in order to arrive at the demand curve of an economy (*Principles*, p. 114); this was presumably due to his general assumption of unimportance.

[2] Marshall also refers to the demand curve for wheat (presumably relating to an economy) where it is clear that this is an open economy which imports wheat, since the effect of the corn laws is mentioned (*op. cit.*, p. 106). This is a further case in which the alternative definition will not yield a stable demand curve. Even with the demand curve for a closed economy as a whole, the case for the alternative definition seems to require that individual tastes should be identical and that the proportion of income spent on each commodity should depend on relative prices only, otherwise a price change could redistribute real income between the heterogeneous consumers and between consumers and non-consumers of a commodity. Then constant real income along the demand curve will give an unstable curve. In one place Professor Friedman seems to recognise this, for in his treatment of the Giffen case (*loc. cit.*, p. 486) he notes that the purchasing power of money may relate to a sector or to a whole economy, and that constancy for the latter is not inconsistent with variation for the former. Such considerations upset the universality of the law of demand for the alternative definition which otherwise could be further evidence for its being Marshall's original definition (Friedman, *loc. cit.*, p. 479, footnote 33). On the interpretation put forward here the purchasing power of money would be virtually constant for the relevant sector of the economy in the typical case (if the current definition was used this would hold for the economy as a whole as well). The explanation of the law of demand on our interpretation would run in terms of an additive utility function or of unimportance as the typical case.

the typical case where the commodity is unimportant—was in Marshall's view the overwhelmingly important situation so far as demand curves were concerned. For the exceptional cases there is no evidence at all as to the definitions that Marshall might have used, but since we must assume that he would match the definition to the situation there is reason to believe that he had a more *ad hoc* approach to such diverse and uncommon cases.[1] This need for an *ad hoc* approach to such cases may be seen as a further reason for his concentration on the typical case in the *Principles.*

The London School of Economics.

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[1] In Part II the third definition has been used in the analysis of exceptional cases, but although this definition would match certain situations it would be most unlikely to match all, or even most, of those which Marshall may have had in mind. However, the definition results in moves along the demand curve having effects on *um* (and the purchasing power of money) which the *Principles* shows to have been characteristic, in Marshall's view, of non-typical cases, and therefore as used in Part II the third definition should not be misleading.

Robert Torrens—1780–1864

By S. A. Meenai

Robert Torrens,[1] the economist, was the son of Robert Torrens of Harvey [*sic*] Hill by Elizabeth Bristow, daughter of the rector of a neighbouring parish.[2] Born in Ireland in the year 1780, he lost his father at the age of ten.[3] He entered the Corps of the Royal Marines in 1797 as a first Lieutenant, married Arabella Harmon of St. Peter's Parish on the 22nd September, 1801[4], and attained the rank of Captain in 1806. His career[5] as an economist began in the year 1808 with the *Economists Refuted*,[6] a reply to William Spence,[7] who had argued that Britain " being independent of commerce " the Napoleonic blockade of Great Britain could have no serious consequences for her. It was, probably, through this pamphlet that Torrens became acquainted with James Mill who himself participated in the Spence controversy.[8] We have no definite information as to when Ricardo and Torrens first met, but this was perhaps not before James Mill's introduction to Ricardo in 1811[9] and Torrens' interest in the bullion discussions. It seems likely that Torrens was introduced to Ricardo by James Mill on his return from the Isle of Anholt in the middle of 1811.

While in command of a body of Royal Marines on garrison duty on the Isle of Anholt in the Kattegat, in the winter of 1810–11, Torrens was seriously wounded in the Walcheren expedition against the Dutch.

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[1] The London School of Economics are planning a reprint of Torrens' *Letters on commercial policy* and this paper, written at their invitation, seeks to give in broad outline a biographical sketch of the economist. It was Professor Edwin Seligman of Columbia University who first drew attention to the significance of Torrens' contribution and the need for its comprehensive study in a paper " On some neglected British Economists " published in the *Economic Journal*, Vol. XIII, 1903.

[2] Dublin Genealogical Office Records.

[3] The will of the Rev. Torrens was proved in 1790 (Dublin Genealogical Office Records).

[4] Dublin Genealogical Office Records.

[5] Torrens' introduction to political economy has been described by Professor George Pryme in his autobiographic recollections:

" He told me the origin of his introduction to the science, that being appointed to the command of some lonely place, he took with him the *Wealth of Nations*, and a few other books on political economy and there mastered the subject ". *Autobiographic Recollections*, edited by his daughter, p. 286.

[6] This maiden work of Torrens had a very favourable reception. The critical *Review* said, " This is the production of a candid, penetrating and reflecting mind. The reasoning is close, perspicuous and acute. We heartily recommend the present admirable production of Mr. Torrens ". The *Annual Review* observed: " In the difficult science of Political Economy he is further advanced by a considerable progress than many who hold their heads extremely high ".

[7] William Spence, *Britain independent of commerce ; or, Proofs deduced from an investigation into the true causes of the wealth of nations, that our riches, prosperity, and power, are derived from resources inherent in ourselves, and would not be affected, even though our commerce were annihilated*, (1807).

[8] James Mill, *Commerce defended* (1808).

[9] Alexander Bain, *James Mill—a biography.*

In recognition of the meritorious services rendered by him he was promoted to the brevet rank of major and was presented with " a sword of a hundred guineas " by his colleagues.[1] Towards the middle of 1811 he obtained leave of absence and returned to England.

Torrens had by then developed a keen interest in Political Economy and his stay in England afforded him valuable opportunities of close contact with fellow economists besides enabling him to carry out a first-hand study of some major economic issues of the day. His *Essay on money and paper currency* was published in 1812 and was followed by *Thoughts on the Catholic question* in 1813. The year 1814 was mainly devoted to a comprehensive work on corn trade which appeared in the beginning of 1815 and met with great success. " At the Geological Club ", Ricardo wrote in a letter dated 27th March, 1815, to Malthus, " his book was spoken of the other day with great approbation. Mr. Blake and Mr. Greenough think that he has exhausted the subject, and that his arguments cannot be controverted. I should think that he is very generally read."[2] Despite the warm reception accorded to the work on corn trade, its sales did not exceed a hundred and fifty copies.[3]

After the publication of his *Essay on the external corn trade*, Torrens' interest in the public affairs of the country grew and he wrote a *Letter to the Earl of Liverpool on the state of agriculture of the United Kingdom* (1816) and also presented a *Paper on the means of reducing the poors rates, and of affording effectual and permanent relief to the labouring classes* to the chairman of the Committee on Poor Laws.

The year 1816 was spent in Ireland. James Mill wrote a letter to M. Napier, the editor of the *Edinburgh Review* on October 23rd, 1816:

> " On turning to your letter for the purpose of answering it, and observing the date, I see I have reason to be ashamed of myself. I am not, however, so faulty as at first sight I may naturally appear, for seeing it would not be in my power to give you an article on Botany Bay, I endeavoured to find out a person who I thought would do it, and as well as anybody you had much chance of finding. The person I mean is Major Torrens, who has written several very good pamphlets on different parts of political economy and who I know had been at pains to collect information respecting Botany Bay, having projects of being sent out to be its Governor."[4]

In 1817 Torrens wrote five letters on the subject of currency to Lord Lauderdale. He also volunteered to review Ricardo's *Principles* in the *Edinburgh Review* and was told that his offer would be accepted if Malthus declined to undertake the work.[5] Though the notice in the *Edinburgh Review* was finally written by McCulloch,[6] Torrens criticised the Ricardian doctrine of value in a letter under the name of R. in the *Scots Magazine* of October, 1818.[1] McCulloch answered his criticism in a letter[2] signed M. in the *Scots Magazine* of November, 1818.

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[1] Nicholas, *History of the Royal Marine Force*, p. 186.

[2] *Letters of Ricardo to Malthus*, p. 75.

[3] *Ibid.*, p. 133.

[4] Bain, *op. cit.*, p. 158.

[5] British Museum Additional Manuscripts Nos. 37949–50.

[6] *Edinburgh Review*, June, 1818, p. 59.

Torrens was elected a fellow of the Royal Society on 17th December, 1818, and during an interlude of his official duties he contested the city of Rochester as a Liberal at the General Election of 1818. He was, however, defeated and presented a petition[3] against the return of Lord Binning. The petition was declared " frivolous and vexatious "[4] and costs were awarded against him. However, he did not lose heart and continued to prepare himself for public life. In a letter dated September 11th, 1817, to his friend, Francis Place, he had written:

> " My first speech at the London Tavern was as usual with me given with too much heat and agitation. In the second I believe I considerably corrected these faults. Both, except the figures and a scrap of poetical exordium, were entirely extemporary and what I conceive to be the best part of the second, that which related to the effects of machinery, had not even been previously arranged in my mind. But though my vanity whispers that I have made some improvement in the art of speaking yet when I listen to the easy and rapid flow of Wooler's words I admire and despair."[5]

The years 1818 to 1820 were evidently not the happiest in his life. In the first place, he had pecuniary worries during this period as appears from a letter from him to Francis Place in September, 1818, in which he requested him to keep back and renew his bill.[6] Secondly he had domestic trouble as is apparent from the following letter:[7]

> My dear Place,
>
> Since I saw you I have encountered the greatest misfortune and calamity of my life. From the directions I formerly gave that nothing must be placed to my account except what I personally ordered you must have suspected that all was not going on comfortably in my domestic circle. I have long been separated and for some time divorced and was on the point of being married to another lady whose sudden death has at once deprived me of all that love and ambition could desire. An intellect of the first order and a fortune more than sufficient for my wants have been snatched from me at the moment I fondly fancied them my own. A resolute spirit may take disappointments yet lightly but there is a dreary loneliness of the heart for which Philosophy has no cure.
>
> I am truly yours,
>
> Robert Torrens.

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[1] *Scots Magazine*, October, 1818.

[2] *Ibid.*, November, 1818.

[3] *A letter to the Independent Freedom of Rochester on the petition against Lord Binning's return* (1819).

[4] *Scots Magazine*, January, 1819.

[5] British Museum Additional Manuscripts No. 37949, f. 50.

[6] British Museum Additional Manuscripts No. 37949, f. 70.

[7] British Museum Additional Manuscripts No. 37949, f. 79.

Torrens obviously did not remain in this frame of mind for long and there appeared in the *Gentleman's Magazine* of September, 1820, a notice of marriage between Lieutenant Colonel R. Torrens and Esther, daughter of the late Ambrose Serle, Esqr., Commissioner of the Board of Trade.[1]

Towards the year 1821 Torrens took up the editorship of the *Traveller* newspaper of which he was also a proprietor. Under him the paper displayed marked interest in economic affairs; even the parliamentary debates were commented upon in the light of the most up-to-date principles of political economy.[2] The *Traveller* was amalgamated with the *Globe* in 1822.

As a signatory to the famous Merchant's Petition Torrens took a very active part in the formation of the Political Economy Club which was founded in London in 1821. Besides being an original member, he had the honour of taking the chair when the first meeting of the club was held at the Freemason's Tavern on April 30th, 1821, to draft the constitution.[3] He then shared with Malthus and Holland the distinction of proposing a question for discussion at the second meeting of the club.[4]

The following brief quotations from J. L. Mallet's *Diaries*[5] will help to depict Torrens' prominent part in the discussions at the club.

> " On most occasions Ricardo and Mill led on one side, and Malthus and Cazenove on the other, Torrens and Tooke occasionally differing with both.[6] (1823).
>
> " The only other subject of discussion we had was as to the progress made in the science of Political Economy since the publication of Ricardo's work and whether the principles of that work were still held in the same estimation. The first part of the enquiry was not gone into, but Torrens held that all the principles of Ricardo's work had been successively abandoned, and that his theories of value, rent, profits, were now generally acknowledged to have been erroneous. As to value, the dissertation on the *Measure of Value*, published in 1825 by Mr. Baillie of Leeds has settled that question. As Thompson had shown that rent was not the effect of differences in the relative productiveness of soils, but the effect of demand and price, and as to profits, it is clear that the part that goes to replacing the capital employed, which Mr. Ricardo had omitted to take into the account, was decisive of the unsoundness of his views."[7]
>
> (January 13th, 1831).
>
> " Malthus who is staying with his sister, Mrs. Bray at Hampstead, called on me on Friday. He had attended the week before, the first yearly meeting of our Political Economy Club and told me that the whole evening was occupied in discussing Torrens' proposed Motion in the House of Commons for the substitution of the

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[1] *Gentleman's Magazine*, September, 1820.

[2] *Traveller*, 1822.

[3] Political Economy Club, *Centenary volume*, 1921, p. 2.

[4] *Ibid.*, p. 5.

[5] *Ibid.*, pp. 205 *et seq.*

[6] *Ibid.*, p. 212.

[7] *Ibid.*, p. 223.

Property Tax for the taxes affecting industry. This sounds very well, but it is the merest two penny trash that can be conceived; and if Torrens was no seeker of office and popularity he is too sensible a man to entertain such views of taxation."[1]

(December, 1831).

" We had a large party yesterday at the Political Economy Club. The question for the evening related to the propriety of allowing the Bank of England to retain the monopoly of London: Torrens was for a Government Bank and talked of these enlightened times and so forth."[2] (March 2nd, 1832).

" After some days of cold and seclusion, I went to town yesterday, and stayed there to dine with my Political Economy Club. The discussion at last ran into a question of value in exchange and on this rock it split, and left us all at sea. McCulloch boldly standing by Ricardo's doctrine that equal quantities of labour are equal in value all over the world and Torrens and Malthus treating it as a ridiculous notion. McCulloch at last challenged Torrens to put this point in the form of a question and pledged himself not to leave him an inch of ground to stand upon; and the question was accordingly framed but afterwards dropped by general consent as only likely to lead to interminable disputes."[3]

(April 6th, 1832).

" I attended my Political Economy Club yesterday . . . I sat by Morrison . . . The conversation being general during dinner he talked politics with Torrens . . . He and Torrens thought that Peel would be deserted by his party, but what is the party without Peel?"[4] (February 6th, 1835).

" Torrens is subtle, often obscure, and not unfrequently wrong, but fluent enough and generally able to explain the principle on which his opinions are founded: he is always courteous in discussion which is not a very common quality among these great men."[5]

(April, 1835).

" I attended my Political Economy Club yesterday. The first question discussed was a question of Torrens, which was unanimously voted to turn upon an impossible case. He claimed the right to discuss any abstract proposition with a view to the establishing a principle, but it was over ruled in the present case which did not go to establish but to disturb a principle that of free trade upon grounds altogether hypothetical."[6]

(May 8th, 1835).

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[1] Political Economy Club, *op. cit.*, p. 228.
[2] *Ibid.*, p. 231.
[3] *Ibid.*, p. 234.
[4] *Ibid.*, p. 264.
[5] *Ibid.*, p. 268.
[6] *Ibid.*, p. 270.

To return to 1826, when Torrens was a candidate for the Borough of Ipswich at the General Election. The returns at the end of the six days' poll were as follows:[1]

W. Haldimand Esq.	496
Col. R. Torrens	495
R. A. Dundas Esq.	488
C. Mackinnon Esq.	488

Mr. Haldimand and Colonel Torrens were accordingly declared elected. But soon after the Election a petition against their return was presented and having decided not to oppose it, they were unseated on February 23rd, 1827. During his brief membership of the House of Commons, Torrens took an active part in the debates.[2]

The following entries in the private diary of Francis Place shed interesting light on the situation in which Torrens found himself upon entering Parliament and his own reaction to it.

> "Thursday, October 12th, 1826.—A long conversation with Colonel Torrens on the most prominent matters likely to be brought before Parliament in the ensuing session . . . and the means of keeping himself independent of cabals which never fail to compromise a man's usefulness."[3]
>
> "Saturday, October 28th, 1826.—Colonel Torrens is willing to do all he can to get a meeting of such titled and other landowners as may be willing to publish a declaration against the corn laws."[4]
>
> "Friday, November 3rd, 1826.—Colonel Torrens—much talk . . . There is some chance that a nucleus will be formed in the new House of Commons of a few men who are too discreet to join the worn-out palsied whigs, and are better informed on the true mode of legislating than men have hitherto been. Cautioned Torrens against joining the club at Clarendon, in which the miserable Whigs stultify every fresh-catched member."[5]
>
> "Thursday, November 16th, 1826.—Colonel Torrens—who is somewhat puzzled with the annoyance of his pretended Whig friends, who, he says, are advising him not to do anything this session of Parliament . . . [or he] will lose himself . . . I advised him, as I have often done before, not to make speeches, but to say whatever he thought was necessary on subjects which he thoroughly understood."[6]
>
> "Tuesday, November 21st, 1826.—Torrens . . . he admitted that he did not mean to take a manly, decided part."[7]

Evidently, there was a remarkable change of intentions on the part of Torrens because his not very long parliamentary career was anything but unmanly and undecided. He made his first parliamentary speech[8] on November 24th, 1826, when the corn importation Acts came under

[1] *Gentleman's Magazine*, December, 1826.
[2] *Hansard*, 1826–27.
[3] G. Wallas, *Life of Francis Place*, p. 178.
[4] *Ibid.*, p. 178.
[5] *Ibid.*, p. 179.
[6] *Ibid.*, p. 179.
[7] *Ibid.*, p. 179.
[8] *Hansard*, 1826.

discussion. He criticised the landlords for attempting to raise agricultural prices by artificial means. He warned that in such a case:

> " Capital would emigrate to more happy climes, and leave the agriculturist to lament over the desolation which he had brought upon himself ".[1]

His second speech on November 30th, 1826, was also in support of the principle of free trade,[2] while on December 6th, 1826, he took part in a debate on " excommunication by Catholic priests ".

The same day, there was a lively debate on Hume's proposal to abolish the ban on the export of machinery. While reiterating his faith in free trade, Torrens opposed the motion on the ground that it would mean the surrender of a valuable and exclusive advantage enjoyed by England.[3]

But perhaps the longest parliamentary speech made by Torrens during his first term in the House of Commons was that delivered on February 15th, 1827, on the subject of emigration from the United Kingdom in which he replied to the criticism against emigration and stressed its advantages. He argued in economic terms:

> " England had a redundant population, while the colonies had redundant land. Emigration therefore was merely a method of the application of the redundant capital and population of the United Kingdom to the redundant lands of the colonies."[4]

On being unseated from Parliament in 1827, Torrens, in the course of the ensuing three years, mainly interested himself in questions of religion and problems of colonisation. In a letter to M. Napier, the editor of the *Edinburgh Review*, he expressed great satisfaction at his efforts to revive public interest in religious matters:

> " I perceive symptoms of a reviving taste for the science of mind in this country and it is to be hoped that the example of France and an occasional article in the *Edinburgh* will stimulate the national intellect to engage in profound enquiries and render metaphysical studies again prevalent among our educated classes ".[5]

The Colonisation Society was founded in the year 1830. Torrens soon became one of its leading lights. In the same year he published a pamphlet entitled *The Crisis and the remedies.*

He was returned to Parliament from Ashburton in 1831 and launched a campaign in support of the Reform Bill. On March 26th, 1832, he advocated the adoption of a motion to appoint a Select Committee to revise the existing taxation with a view " to the repeal of those burdens which press most heavily on productive industry, and the substitution of a tax upon property in lieu thereof ". In his[6] opening remarks he paid an eloquent tribute to the memory of Ricardo.

On April 24th, 1833, he moved that a committee be appointed to inquire into the distress of the country, and to ascertain how far that distress could be relieved by an improvement in the system of banking and paper currency.[1] On June 28th, 1833, he moved that the consideration of the question of the renewal of the Bank of England charter should be postponed until the next session of the Parliament.[2] On March 5th, 1834, he presented three petitions in the House of Commons, and pressed for the appointment of a Select Committee to inquire into the distress among the handloom weavers and to suggest the most practicable measures of relief.[3]

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[1] *Hansard*, 1826. [2] *Ibid.*, 1826. [3] *Ibid.*, 1826. [4] *Ibid.*, 1827.
[5] British Museum Additional Manuscripts No. 34614, f. 426. [6] *Hansard*, 1832.

Besides these important debates, Torrens also spoke on factories' regulations, the abolition of slavery, the renewal of the Bank charter, the Budget for 1834–5, the impressment of seamen, the repeal of the corn laws, poor law measures, the Labourers' Employment Bill, the Customs Act, the colonisation of South Australia and the Irish tithes.

In the year 1834, he published his work *On Wages and combination*, which he dedicated to the electors and inhabitants of Bolton. He said:

> " It is the universal interest of the town that labour should obtain an ample reward and as the representative of that universal interest I have felt it to be my duty to endeavour to ascertain, upon what principles, and to what extent it is practicable to increase wages ".[4]

Torrens was an original member of the South Australian Land Company which was formed in 1831 and was reorganised in 1834 as the South Australian Association. In May, 1835, he was appointed Chairman of the body of nine Commissioners to establish provinces in South Australia. His work on the *Colonisation of South Australia* appeared soon after.

Torrens retired from the House of Commons in the year 1835, perhaps largely owing to pressure of work as Chairman of the Colonisation Commissioners. Despite the fact that in 1837 he succeeded in securing a salary for himself, he was not very happy with the body of which he was the Chairman. Matters became worse after the appointment of Lord Eliot as the Agent General with a separate office. Lord John Russell, the Colonial Secretary at the time, said in an official note:

> " Colonel Torrens tells me that the result has been to produce a lamentable waste of time and to convert the Board into a sort of debating club discussing for days together the most frivolous and unmeaning subjects ".[5]

Lord Russell was himself no less dissatisfied with the administrative machinery for emigration. He therefore dissolved the Board of South Australian Commissioners at the end of 1837, and called upon Torrens and Eliot to draw up in consultation proposals for the appointment of a Colonial and Land Emigration Commission. After they had submitted their proposals, the draft for the appointment of the commission was prepared by the Permanent Under-Secretary Stephen and sent to the Parliamentary Under-Secretary, V. Smith, who wrote on the margin:

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[1] *Hansard*, 1833.
[2] *Ibid.*, 1833.
[3] *Ibid.*, 1834.
[4] *On Wages and combination* (1834), p. vi.
[5] Colonial Office, 384/62.

> " I would not comply with such nonsense. Why should not Col. Torrens be always first on account of his age.—R.V.S."[1]

The names in the draft were made to read Torrens, Eliot, Villiers.

The Emigration Commission was hardly a few months old when a rift appeared in its ranks. A report on the colonisation scheme of Port Essington was drawn up and signed by Eliot and Villiers. Torrens dissented and voiced his differences in a long memorial on the subject addressed to Lord John Russell. Stephen, who was the first to read the memorial, observed:

> " This is very inconvenient practice. In this case there is little difference, but in others the harmony of the Commission might be destroyed by it. Inform Col. Torrens that as a Commissioner he can only act with his colleagues, and that any paper of his not agreed to by them can only be considered as the letter of a private individual."[2]

Russell was also displeased and agreed with Stephen. Torrens' colleague on the commission, Eliot, was evidently in the know of things and was keen on making capital out of this dispute. No sooner did he learn of Lord Russell's reaction to Torrens' memorial, than he hastened with Villiers to write to Stephen that:

> " Such a course of proceedings tends to weaken our authority as a Board and to diminish our usefulness to the Department under which we serve."[3]

This, the letter said, was Torrens' second offence. When the question of a secretary for the Commission had come up for discussion, Torrens had advocated a separate official for the South Australian Commission, instead of one for both. The letter requested Lord Russell to restrain Torrens from making separate reports. Stephen regretted " the commencement of discord " but trusted it would be " arrested ". Lord Russell was rather more curt. He said:

> " Inform these gentlemen that as it is not my intention to receive any separate reports from one of the Commissioners only, I think it unnecessary to enter into correspondence upon an occurrence which I hope will not again take place ".[4]

The matter thereupon ended but clearly the unity of the Board had been seriously impaired. Before the year was out Torrens wrote to Russell seeking to be allowed to leave the Commission. On December 15th, 1839, he formally tendered his resignation on the ground that he possessed land in Australia of the value of £1,000 and therefore ought not to be a member of the Commission. Russell accepted this plea with the option that Torrens could retain his post if he so desired, after disposing of the land. A few months later the *Colonial Gazette* announced that:

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[1] Colonial Office, 384/62. [2] *Ibid.* [3] *Ibid.* [4] *Ibid.*

> " It is understood that Col. Torrens has resigned his seat ".[1]

But it was not until July, 1841, that the appointment of G. S. Lefevre was announced in place of Torrens.[2]

In 1837 Torrens had published a *Letter addressed to Lord John Russell on the ministerial measure of establishing poor laws in Ireland* and another to the Rt. Hon. Lord Viscount Melbourne on the causes of the recent derangement in the money market and on bank reforms. In the same year he published an *Address to the farmers of the United Kingdom on the low rates of profit in agriculture and in trade.* (His *Letters on commercial policy* had appeared in 1833.)· In 1839, he wrote three letters to the Marquis of Chandos on the effects of corn laws. In 1840 he addressed a *Letter to Thomas Tooke Esq., in reply to his objections against the separation of the business of the Bank into a department of issue and a department of deposit with a plan of bank reform.*

In the latter part of the year 1840 there was a rumour of Torrens' death which led to the appearance of a brief obituary notice[3] in the *Gentleman's Magazine* in November, 1840, and strangely enough this notice remained uncontradicted.

Torrens was one of the signatories to the letter and memorial addressed to Lord John Russell in 1842. In 1843 he wrote a letter to N. W. Senior in reply to his article " Free Trade and Retaliation " in the *Edinburgh Review* and two letters to Sir Robert Peel on the condition of England and the means of removing the causes of distress.

In 1844 appeared a *Letter to Lord Ashley on the principles which regulate wages and an inquiry into the practical working of the proposed arrangements for the renewal of the charter of the Bank of England, a reply to the objections of the " Westminster Review " to the government plan for the regulation of the currency and the budget : on commercial and colonial policy.* That Torrens did not lose his interest in banking and colonisation is shown by his publication in the year 1847 of the *Principles and practical operation of Sir Robert Peel's Bill of 1844, as it affects commercial credit.*

This was Torrens' last contribution on the subject of money and banking and as such may be a convenient point for attempting a brief exposition of his leading role in the monetary and banking discussions of his time. His interest in this branch of economics surpassed that shown by any of his more famous contemporaries. His contributions were spread over a quarter of a century which embraced both the debate that followed between the bullionists and anti-bullionists following the suspension of cash payments by the Bank of England, as well as the controversy between the Currency and Banking schools. During this period there was considerable development in Torrens' views on the subject.

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[1] *Colonial Gazette*, April, 1840.

[2] It is however, of some interest that on June 2, 1846, Torrens lodged a request with Stephen that he be either reinstated as Commissioner or else be granted a pension. The request was turned down.

[3] *Gentleman's Magazine*, 1840.

The first contribution, namely *Essay on money and paper currency* (1812), contained a detailed discussion of the problem of inflation. It argued that an increase in the quantity of money, combined with a rise in the velocity of circulation, brought about an increase in the demand for goods without increasing their supply and resulted in a rise in prices. Profits and money wages rose which had a stimulating effect on productive activity ultimately leading to an increase in production. As a result, inflation and the higher domestic price level lowered exports and raised imports. While advocating the use of paper currency in preference to gold and silver in view of its greater elasticity, Torrens was opposed to an inflationary policy as a method for stimulating economic activity.[1]

As to the more specific issue in the controversy between the bullionists and non-bullionists, namely depreciation of paper issued by the Bank of England, Torrens held that paper issued against good short-term commercial bills could never be issued in excess. It was always issued to satisfy genuine demand and was withdrawn from circulation and returned to the Bank as soon as the demand for it ceased.[2] According to Torrens, the real cause of depreciation of bank notes was an adverse balance of payments position which had led to an outflow of precious metals. He therefore suggested a drastic pruning of foreign exchange expenditure and reduction of imports.[3]

There was already much development and change in Torrens' views during the period which separated his *Essay on money and paper Currency* (1812) from his *Comparative estimate* (1819). In the *Essay* he had vigorously upheld the views of the anti-bullionists and had denied any depreciation in paper currency. But in his *Comparative estimate*, though arguing that a rise in the price of gold may not necessarily be caused by depreciation of paper and will be a result of an extraordinary demand for gold arising from an adverse balance of payments position, he agreed with the bullionists that precious metals were the real standard and paper currency only a substitute.[4] He referred, however, to the dangers of currency appreciation, emphasising that it was wiser to stabilise the currency at its depreciated value rather than let loose a deflationary force of great magnitude by suddenly raising the value of the currency.

In a *Letter to the Right Hon'ble Lord Viscount Melbourne* (1837) Torrens attempted to establish two main principles, namely that bank deposits formed a part of the money supply and that banks could create credit and thus increase the quantity of money.[5] This letter showed further change in his views as the emphasis on the need for regulating convertible paper currency on the same principles as metallic currency was somewhat incompatible with his previous position as the advocate of inconvertible paper currency.

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[1] p. 54. [2] *Ibid.*, p. 127. [3] *Ibid.*, p. 181. [4] *Comparative estimate*, p. 51.
[5] *Letter to Lord Melbourne*, pp. 12–16.

In a subsequent *Letter addressed to the Right Hon'ble Lord Viscount Melbourne* on derangement in the money market and on bank reform Torrens argued that the authority of note issue should vest in one bank which should not perform the ordinary commercial banking functions.[1] The central bank should be allowed to issue notes up to a certain limit beyond which paper currency should be covered by gold. The central bank should be managed in the public interest rather than left to the mercy of the shareholders. In a *Letter to Thomas Tooke* (1840) Torrens proposed that with a view to checking overtrading the Bank of England be divided into two separate departments: one for the purpose of issuing a fixed quantity of notes and the other for carrying on the business of banking.[2] He observed that those who argued that the banks could not increase the amount of notes in circulation since there were two parties to a loan and unless someone would borrow no one would loan, were really confusing the issues. The real question was whether the banks could indulge in overtrading under conditions of inflation when there was sufficient demand for credit.

The Bank Charter Bill passed in 1844 was undoubtedly a triumph of the principles advocated by Robert Torrens. In the *Principles and practical operation of Sir Robert Peel's Act of 1944 explained and defended* Torrens answered the criticism against the Act and argued that by the separation of the departments of issue and banking the Act had fully ensured that convertibility would not be endangered through increasing note circulation in case of adverse balance of payments or through contracting the circulation during a favourable balance of payments position. Torrens was sharply critical of the Bank of England for keeping their discount rate above the market rate under conditions of a favourable balance of payments and inflow of gold and below the market rate under conditions of an unfavourable balance of payments and outflow of gold. It was distinctly harmful, he argued, to prolong an inflow of gold by keeping the bank rate above the market rate when money was already " abundant " or to accelerate an outflow of gold by keeping the bank rate above the market rate when " loanable capital " was becoming " deficient " in relation to demand.[3]

The *Principles and practical operation of Sir Robert Peel's Bill* was followed by *Self-supporting colonisation: Ireland saved without cost to Imperial Treasury* (1849), *Systematic Colonisation* (1849) and a *Letter to Lord Eliot on colonisation.*

In 1851 he resigned the membership of the Political Economy Club, having remained a member for no less than thirty years. In 1852 his tract on *Finance and trade* appeared in which he examined the pros and cons of continuing the income tax and decreasing the import duties and vice versa: in 1855 he published *political economy and representative government in South Australia.*[1]

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[1] p. 39. [2] *Letter to Tooke*, p. 7.

[3] *Principles and practical operation of Sir Robert Peel's Act*, p. 176.

He passed away at the age of 84 at 16, Craven Hill, London, on May 27th, 1864. It was believed that one of his books, *A Catechism of political economy*,[2] was in the press at the time of his death.[3]

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[1] Palgrave's *Dictionary of Political Economy* attributes it to his son.

[2] *Globe*, June 4, 1864.

[3] On Monday evening, May 30, 1864, there appeared the following notice of his death in the *Globe and Traveller* which he himself once owned and edited.

"On the 27th instant at his residence 16, Craven Hill, Lt.-Col. Robert Torrens, F.R.S., the well-known author of several well-known works on economic science."

The *Annual Register* said:

"He was an indefatigable writer; the productions of his pen, which include a great variety of tracts on subjects of political economy, some able pamphlets on the currency, and some literary efforts of lighter class, extend over a period of fifty years. For some time Colonel Torrens was a part proprietor and editor of the *Globe* newspaper. He was a skilful and lucid writer and succeeded in throwing considerable light upon some of these abstruse questions connected with monetary science which are the stumbling block of economical students."

The *Spectator* observed:

"The late Colonel Torrens—We sincerely regret to record the death of Lt.-Col. Torrens who died yesterday week, (the 27th May), in the eighty fourth [*sic*] year of his age. Colonel Torrens will be remembered chiefly by his economical writings and his connection with the colonisation of South Australia but his career as an officer was not entirely without mark and incident. In 1811 he was promoted to the rank of Major for what was then generally called the "romantic defence of Anholt", an affair in which Captain Torrens repulsed a Danish force which outnumbered his garrison by nearly ten to one. He was a warm advocate of the rights of the Roman Catholics in Ireland and even refused the offer of a Government borough in 1811 [?]—an offer drawn forth by the ability of his *Essay on money and paper currency*—rather than abandon that cause. He fought and gained a most expansive contest in Ipswich in 1826 on the Roman Catholic side, only to be unseated on petition but not before he had made a speech on Ireland which drew forth the warmest praise from Mr. Huskisson, and has in fact proved prophetic. Colonel Torrens was in the house during several parliaments, first for Ashburton, then for Bolton, and his books on political economy, one of which—*Catechism of political economy*—was, we believe, in the press at the time of his death, secured him a very high position as a clear and original thinker. He laboured hard in the foundation of the colony of South Australia to control the blind policy of a not very wise Government and succeeded in his work. To the last he impressed all who knew him with the calm and lucid character of his judgement, and attracted them with something of that perfectly simple dignity, that old English courtesy, that stately kindness of manner which appear to be something rarer and rarer in our bustling and familiar day."

Earned and Investment Incomes, U.K. 1952-53

By E. C. Rhodes

In the 97th Report of the Commissioners of Inland Revenue for 1954 (Cmd. 9351, Jan. 1955), Table 55 shows the classification of incomes by range of income before tax for 1952–53. This table gives estimates of the number of incomes in certain grades, and the amount of income for each grade. The total number of incomes is estimated as 19,800,000 and the total income £10,150 mn. The lowest income is £155.

Tables 72 and 73 present, for surtax incomes, an analysis of earned income in various ranges of total income, and an analysis of investment income in various ranges of total income. It is possible, from these last two tables, to obtain, by simple addition and subtraction, the number of incomes distributed according to certain grades of earned income and investment income. Also, as these tables indicate the amounts of earned income and investment income respectively for the various numbers of incomes, it is possible for us to estimate fairly well the amount of earned income and investment income contributed to the total by the various numbers of incomes in the new table, showing the distribution according to earned and investment incomes.

As the surtax figures for 1952–53 presented in the 97th report are modified in subsequent years, in the light of later information, we must modify our new table by various multipliers in order to make the total figures fit in with the estimates given in table 55.

When that part of the new table relating to incomes below £2,000 is considered, we can rely on certain data given in the 94th Report for 1951 (Cmd. 8436, Jan. 1952), relating to 1949–50, in table 90. These data present facts, in fine detail for total income, relating to number of incomes and the amount of earned and investment income. We can find, for 1949–50, how many incomes in various grades of total income are wholly earned, how many are wholly investment incomes, and how many are partly earned and partly investment income. It is possible to estimate reasonably well the various amounts of the two kinds of income appropriate. Further, by assuming likely distributions of the partly earned and partly investment income group for each grade of total income, it is possible to estimate the numbers of incomes in various combined grades of earned and investment income. In order to obtain corresponding figures for 1952–53, we use appropriate multipliers, so that the new data fit in with the table 55 of the 97th Report. We are also able to estimate the corresponding amounts of earned and investment incomes. The results are shown in tables 1, 2, 3, 4.

It is admitted that the figures in these tables cannot pretend to absolute accuracy. The original table 55 in the 97th Report gives estimated figures. We have tried to use these figures in order to get some idea of the combined distribution of earned and investment income, using what knowledge is available on this matter. The figures in the higher ranges of earned and investment incomes in these tables are probably more unreliable than those in the lower ranges.

The total amount of earned income is estimated as £9,093 mn., the total amount of investment income as £1,057 mn. The total investment income is about 10 per cent. of the total income. In 1949–50, the ratio was also about 10 per cent.

We estimate that there were 13,205,000 incomes where both earned income and investment income were less than £500. This represents about 67 per cent. of total incomes. It is possible to split this large block of incomes into four parts, using a division at £250.

The details are shown in table 4. We estimate that there were 3,259,000 incomes where both earned and investment incomes were below £250, i.e., 16·5 of all incomes. These account for 7·0 per cent. of all earned income (£635 mn.) and 5·0 per cent. of all investment income (£53 mn.). The mean income of this group is £195 earned and £16 investment, totalling £211. It is remembered that the lowest income is £155.

There were 9,787,000 incomes where the earned income was between £250 and £500 and the investment income less than £250, i.e., 49·4 per cent. of all incomes. These account for £3,637 mn. earned income, i.e., 40·0 per cent. of all, and £103 mn. investment income, i.e., 9·8 per cent. of all investment income. The mean income of this group is £371 earned and £10·5 investment, totalling £381·5.

There is a much smaller group of 136,000 incomes where the earned income is less than £250 and investment income is between £250 and £500. This represents 0·7 per cent. of all incomes and accounts for a negligible amount of earned income and 5 per cent. of all investment income.

The next large group in the table are those incomes where the earned income is between £500 and £1,000 and the investment income is below £500. There are 5,559,000 such incomes, 28 per cent. of all incomes. These account for £3,504 mn. earned income (39 per cent. of all earned income) and £132 mn. investment income (12 per cent. of all investment income).

An interesting broad grouping of the facts of tables 1, 2, 3 is given below, where divisions are made at £1,000 for earned and investment incomes.

From this we see that about 0·3 per cent. of all incomes are those with more than £1,000 earned and £1,000 investment incomes. These account for nearly 2 per cent. of all earned income and 15 per cent. of all investment income. By contrast about 96 per cent. of all incomes are those with less than £1,000 earned and £1,000 investment incomes;

NUMBER OF INCOMES AND AMOUNTS OF EARNED AND INVESTMENT INCOMES. (Numbers in 000's and amounts in £mn.'s.)

		EARNED INCOME		
INVESTMENT INCOME		Less than £1,000	More than £1,000	All
Less than £1,000	Number ..	18,981	646	19,627
	Earned Amount ..	7,804	1,101	8,905
	Investment Amount ..	495	93	588
More than £1,000	Number ..	119	54	173
	Earned Amount ..	13	175	188
	Investment Amount ..	307	162	469
All	Number ..	19,100	700	19,800
	Earned Amount ..	7,817	1,276	9,093
	Investment Amount ..	802	255	1,057

they account for nearly 86 per cent. of all earned incomes and 47 per cent. of all investment incomes.

In table 2 there is shown a series of figures representing the mean earned incomes for the various grades of investment income. We note a gradual increase in the mean earned income as the investment income increases. There is some correlation between earned and investment incomes. In table 3 similar figures are given showing mean investment incomes for the various grades of earned income. Again, after a slight decline from the first to the second grade there is a gradual rise in mean investment income as earned income increases. The regression is not linear and the correlation is slight; in terms of the appropriate coefficient, it is of the order of about 0·2.

If we ventured to make an attempt at estimating the capital value corresponding to a total investment income of £1,057 mn. at 4½ per cent., we should obtain a figure of £23,500 mn. The capital value apportioned on this basis to the 13,505,000 incomes, where the earned income is less than £500, is £13,700 mn., i.e., approximately £1,000 each.

The London School of Economics.

TABLE 1

U.K. 1952–53 ESTIMATED DISTRIBUTION OF INCOMES, DISTINGUISHING GRADES OF EARNED AND INVESTMENT INCOME. Numbers in 000's.

INVESTMENT INCOME (£000)	EARNED INCOME (£000) Under 0·5	0·5–	1–	1·5–	2–	2·5–	3–	4–	5–	6–	8–	10–	All
Under 0·5	13,205	5,559	374	104	51	26	23	8	4	3	1	2	19,360
0·5–	195	22	17	9	8	6	5	2	1	0	1	1	267
1–	43	5	5	4	3	2	3	1	2	0	0	0	68
1·5–	20	3	3	1	2	1	2	0	1	1	0	0	34
2–	12	2	0	2	1	1	1	0	0	0	1	0	20
2·5–	9	0	1	0	1	0	0	1	0	1	0	0	13
3–	8	1	1	1	0	0	1	1	0	2	0	0	15
4–	5	1	0	0	0	0	0	2	0	0	0	0	8
5–	2	0	0	1	1	1	0	0	0	0	0	0	5
6–	3	0	1	0	0	1	0	0	0	0	0	0	5
8–	0	2	0	0	0	0	0	0	0	0	0	0	2
10–	3	0	0	0	0	0	0	0	0	0	0	0	3
All ..	13,505	5,595	402	122	67	38	35	15	8	7	3	3	19,800

TABLE 2

ESTIMATED AMOUNTS OF EARNED INCOME, DISTINGUISHING GRADES OF EARNED AND INVESTMENT INCOME. (Amounts in £mn.'s)

INVESTMENT INCOME (£000)	EARNED INCOME (£000) Under 0·5	0·5–	1–	1·5–	2–	2·5–	3–	4–	5–	6–	8–	10–	Total earned Income	Mea earne Inco £
Under 0·5	4,282	3,504	437	171	114	71	79	38	20	19	0	32	8,767	450
0·5–	3	15	19	16	15	19	16	10	7	5	5	8	138	520
1–	1	4	4	6	9	4	8	5	5	1	4	8	59	870
1·5–	0	2	3	4	2	4	5	3	3	0	4	3	33	970
2–	1	1	1	2	3	1	3	3	1	0	3	3	22	1,100
2·5–	0	1	1	1	1	2	2	2	0	0	6	0	16	1,230
3–	0	1	1	2	1	1	3	1	0	9	0	0	19	1,270
4–	0	0	0	0	1	1	0	0	1	7	2	0	12	1,500
5–	0	0	0	0	0	0	0	0	2	6	0	0	8	1,600
6–	0	0	0	0	0	0	1	4	3	0	0	0	8	1,600
8–	0	0	0	1	2	0	1	0	0	0	0	0	4	2,000
10–	1	1	3	1	0	0	1	0	0	0	0	0	7	2,330
Total earned Income	4,288	3,529	469	204	148	103	119	66	42	47	24	54	9,093	

TABLE 3

ESTIMATED AMOUNTS OF INVESTMENT INCOME, DISTINGUISHING GRADES OF EARNED AND INVESTMENT INCOME. Amounts in £mn.'s.

INVESTMENT INCOME (£000)	EARNED INCOME (£000) Under 0·5	0·5–	1–	1·5–	2–	2·5–	3–	4–	5–	6–	8–	10–	Total investment Income
Under 0·5	214	132	33	11	6	4	3	1	0	0	0	2	406
0·5–	135	14	10	7	6	3	3	2	1	0	0	1	182
1–	52	6	6	6	2	3	2	1	2	0	0	1	81
1·5–	34	6	6	1	4	1	3	2	1	0	0	0	58
2–	27	6	0	4	1	2	2	1	0	0	0	1	44
2·5–	24	0	4	1	2	1	2	1	0	0	0	0	35
3–	29	6	3	3	2	2	2	0	0	0	0	4	51
4–	21	3	2	1	2	1	1	0	0	0	1	4	36
5–	15	2	1	1	0	0	0	0	0	4	3	0	26
6–	15	2	1	0	0	0	0	3	5	7	1	0	34
8–	0	0	0	0	3	7	4	5	2	0	0	0	21
10–	52	7	6	6	6	0	6	0	0	0	0	0	83
Total Investment Income ..	618	184	72	41	34	24	28	16	11	11	5	13	1,057
Mean investment Income (£)	46	33	180	340	510	630	800	1,070	1,370	1,570	1,670	4,330	

TABLE 4

ESTIMATED DISTRIBUTION OF INCOMES, DISTINGUISHING GRADES OF EARNED AND INVESTMENT INCOME, SHOWING AMOUNTS OF EARNED AND INVESTMENT INCOME.

(Numbers in 000's, Amounts in £mn.'s).

EXTENSION OF FIRST BLOCK FOR EARNED AND INVESTMENT INCOME LESS THAN £500.

EARNED INCOME

INVESTMENT INCOME		Under 0·25	0·25–0·5
Under 0·25	Number	3,259	9,787
	Earned Amount	635	3,637
	Investment Amount	53	103
0·25–0·5	Number	136	23
	Earned Amount	1	9
	Investment Amount	50	8

The Purchasing-Power of British Exports—A Rejoinder[1]

By R. Marris

The authors' comment is concerned mainly with the last few paragraphs of the article (where one of two alternative interpretations of the results is discussed) but they also offer pleasantries, *en passant*, on the main findings. These criticisms concern (1) my adjustments to the post-war data and (2) the historical incidence of major changes in U.K. manufacturing export prices relatively to those of competitors. In (1) they appear to have overlooked a footnote discussing one of the points they make (fn. 1, p. 20) and also either to have overlooked or completely misunderstood the discussion of the nature and purpose of the adjustments as described in text (p. 19) and Appendix. I am more than content to let the original passages stand in their own defence without further elaboration. (2) arises from a sentence on p. 21 of the article, " Of such an event history (since 1918) has little experience ". These words, as it happens, were put into the mouth of an imaginary critic of the interpretation, but be that as it may, their context surely implied self-evidently " . . . sufficiently little experience significantly to have affected the regression ", which is obviously true. I discussed one exception (devaluation of 1949) but not the only other (devaluation of 1931).. At the time it seemed to me that the results of the 1931 episode were too negative and too ambiguous to be of much use in the analysis; they yielded no significant changes (either 1931/2 or 1932/3) in the U.K. terms of trade nor in the absolute level of her manufacturing exports. (Sir Donald MacDougall was, in effect, describing changes in U.S. exports.) On further investigation I now suggest that what happened was that the devaluation warded off an improvement in the U.K. terms of trade and decline in exports which would otherwise have occurred,[2] thus supporting the view that at least in certain circumstances this country does have the power to manipulate her terms of trade (and level of trade) by economic policy (see below).

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[1] The references are Marris, *Economica*, February, 1955 and Paish and Morgan *Economica*, November, 1955.

[2] To the extent that the U.K. terms of trade were a little correlated with world trade (see below) the regression coefficient of the one on the other was about ·4, i.e. a 10 point drop in the index of world trade in manufactures would have been expected, within a rather wide margin of error, to have been accompanied by a 4 point improvement in the index of U.K. terms of trade. Thus the 13 per cent. drop in world trade between 1931 and 1932 should have been followed by a 5 per cent. improvement in the terms of trade and about a 10 per cent. drop in U.K. exports (the indexes being near unity at that time). So as a result of the devaluation, the U.K. experienced higher exports, less unfavourable balance of trade and a lower base-weighted index of real national expenditure (until the U.S. retaliated) than she would have done otherwise. From my point of view the case is a remarkably favourable one !

On the main issue I cannot avoid suggesting, with the very greatest respect, that the authors have climbed the wrong tree. By this I mean that I recognise that my first suggested interpretation was more than a little debatable, but Professor Paish and Mr. Morgan have so seriously misunderstood its nature as to apply statistical tests which do not, in fact, test it. The interpretation involved two propositions, (A) that the observed historical relationship represented some sort of approximation to the appropriate static " Foreign Transformation " or " Offer " curve facing the U.K. and (B) that this was a curve along which it was within the power of internal economic policy to cause the nation to move. The theory of the curve, as treated in the considerable literature, involves a constant balance of trade in real terms and a given level of production in customer countries. The curve relates the real volume of exports to the real volume of imports which can be bought for them, i.e. it relates the level of trade (defined either by reference to imports or exports) to the terms of trade. Its shape depends on three groups of effects, (i) any substitution-effect, among foreign consumers, deriving from the change in prices of our exports relatively to the internal price level in their own countries, (ii) the overall income-effect, i.e. the effect on customers' demand for imports of the change in their real income attributable to the change in the terms of trade, and (iii) various complicated income—and substitution—effects on the quantity of goods offered by them to us. If foreign tastes, technology and aggregate production are constant, there will exist a determinate level of the terms of trade for every given level of trade and vice-versa. At this stage of the argument it is largely immaterial whether the effects (i), (ii) or (iii) are the most important or which factor was autonomous in causing the change, the terms of trade or the volume of trade. It is also immaterial whether any given change in the terms of trade is caused mainly by a change of import prices or of export prices and, of course, it is always likely that an absolute rise in export prices will be accompanied by an absolute rise in exports so long as the rise in export prices was less than that of import prices. The essential point is that the various effects (i), (ii) and (iii) are extremely difficult to disentangle both in theory and in measurement. But since an extremely high proportion of the variance in U.K. exports[1] could be explained with an equation which in principle combined them all, it seemed to me to be worth while attempting to discuss the related questions independently of the ultimate decomposition. The basic misunderstanding of Professor

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[1] A considerably higher proportion, it should be said, than in previous formulations involving at least two explanatory variables. E.g. Polak (*An International Economic System*, Allen and Unwin, 1955) in his section on the U.K. (p. 113) using world trade in manufactures and a trend obtains a multiple correlation coefficient no greater than ·89, despite the fact that his trend factor behaves a little like the terms of trade. The comparison with Chang (*Cyclical Movements in the Balance of Payments*, Cambridge, 1951) is also favourable.

Paish and Mr. Morgan, therefore, lay in attributing to me a belief (overt or implied) that effect number (i) was predominant in the sense that changes in the terms of trade in the past arose mainly from British manufacturers trying to force out exports and so driving down prices. The mechanism is by no means required to take that form for the argument to be sustained, all that it is necessary to accept is that foreigners must be bribed by a determinate amount if we wish more trade with them at a given level of their production.

Thus the authors' demonstration that, in the past, the changes in the terms of trade came mainly from changes in import prices is not very relevant until we discuss the proposition (B) above. However, their method of analysing the data has misled them into overstatement. It is true that a good statistical explanation of British exports can be obtained in terms of import prices alone, but there is a substantial and significant improvement in the correlation (from ·91 to ·975) if export prices are included by substituting the terms of trade as a variate. A serious criticism (which I discussed but did not fully test) would be that since the U.K. terms of trade are known to be associated with world trade and production, the high zero-order correlation between U.K. exports and U.K. terms of trade might be entirely explicable by a high zero-order correlation and causal relation between U.K. exports and customers' production (which latter is supposed in the theory to be held constant). I have now investigated this further and find that the zero-order correlation between U.K. terms of trade and, e.g. world manufacturing imports, was in the inter-war period rather less than has been supposed, i.e. only ·47, so that the partial regression of U.K. manufacturing exports on world trade in manufactures in a multiple regression equation which also includes the terms of trade as a variate, was negligible.[1] This of course is not conclusive but is nevertheless suggestive, particularly in the light of the 1931/2 episode (see above).

Turning to proposition (B) (see above), the step involved—and I would be the last to deny that it is a debatable one—is from the observation that when something happens to the terms of trade something also happens to the level of trade, to the suggestion that it is within the power of government to manipulate the one in order to change the other *and* that in the course of the manipulation the government may expect a relationship (between the two changes) of roughly the same order of magnitude as observed in the case of the largely autonomous changes of the past: the mechanism may take various forms and it is assumed that the result is independent of the mechanism chosen. The exchange rate might be appreciated, thus improving the terms of trade, and the subsequent deterioration of the balance of payments stopped by increased tariffs or subsidies to import-saving production. Alternatively, the latter might come first,[2] thus reducing the level of imports; exports would then be reduced by appreciating the exchange-rate and profiting on the terms of trade. Now, one can think of a number of reasons for questioning proposition (B), but Professor Paish and Mr. Morgan do not discuss any. For example, one may argue that this country's international trading position is not sufficiently strong for her to be able to alter her terms of trade significantly, or one may point to the special financial position with the Sterling Area. However, it appears these arguments must imply that as a nation we have little control over our level of trade, which I believe is unduly defeatist.

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[1] By the same token, the zero-order correlation of U.K. exports on world trade (both in manufactures) is also poor, about ·5; cf. fn. 2, p. 67 above.

[2] This was the method suggested in the article.

The *desirability* of such manipulations depends on the quantitative relationship between cause and effect, but assuming for the sake of argument that they are *possible*, it becomes permissible to argue that at some given level of world production and strength of internal need for imports, and with a given estimate of the quantitative relationship, the country would do better with a different level of trade than that which obtains: this can be put as either that we are importing too much or that we are exporting too much, both, on the assumption of balanced trade,[1] meaning the same thing. Perhaps if, in the article, I had put it the other way about, the misunderstanding with Professor Paish and Mr. Morgan would not have arisen ?

Finally it seems fair to comment that the authors, while criticising my suggestions, still produce no positive evidence for the orthodox point of view;[2] they give no reasoned case for believing that it is possible to expand exports at a faster rate than yielded by the expansion of world production without accepting a substantial deterioration of the terms of trade.[3] Mr. Morgan has impressively demonstrated (in collaboration with Mr. Corlett)[4] that some of the relevant elasticities are extremely elusive, and difficult, if not impossible, to measure, but this does not mean that policy should therefore be conducted as if all of them were known to be high.

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[1] But cf. Cairncross, *The Listener*, May 12th, 1955.

[2] The most influential attempt was that of Sir Donald MacDougal's original article, as criticised by Mr. R. J. Nicholson in the current *Economic Journal* (see *E.J.*, December, 1951, September, 1952 and December, 1955). But it is not at all clear that Sir Donald's "elasticity of substitution" between U.S. and U.K. exports, when adjusted into an elasticity of demand for U.K. exports taken alone, is inconsistent with the time-series results here under discussion.

[3] With reference to the authors' footnote 2, p. 332 in this connection, it goes without saying that one can hold the belief that the deterioration in the terms of trade can be avoided if one believes that British selling methods (and other qualitative factors in the export drive) will improve at a faster rate than those of competitors. This aspect of the export drive is obviously laudable, since, as the authors point out, if successful it will, *ceteris paribus*, improve the terms of trade. But it was not of course the aspect which was in question in my article.

[4] Corlett and Morgan, *JRSS*, 1951.

Trade and State Action in an " Underdeveloped " Economy

By Sir Sydney Caine

Mr. Bauer's prolonged studies of West African trade have led him, and I hope will inspire others, to reflections of far more than local interest on the significance of trading habits in such an economy and the consequences—designed and undesigned—of state intervention in trade. I want in this article to discuss some of these wider implications rather than the details of Mr. Bauer's book; but before coming to the more general points something needs to be said about the book itself.[1]

In the first place it presents a far more detailed account of the internal exchange economy of British West Africa than has hitherto been published. The factual picture which emerges, complementing Sir Keith Hancock's famous general study of the West African economies in relation to the external world and the recent United Nations study of the development of money economies in Africa, is simple in its broad outlines, however varied in the detail in which Mr. Bauer moves so familiarly. Leaving aside the European-operated mining enterprises, the British West African economies are based on a very large number of small-scale producers with very low incomes, however measured, and correspondingly low capital equipment, but possessed of an intense and ubiquitous trading habit and tradition. Externally trade has consisted of the exchange of a few widely produced but uniform commodities against a more numerous but still rather narrow range of comparatively simple consumption goods. Technical considerations —the bulk rather than quality nature of exports and to a less extent of imports, shipping factors and convenience of financing—have led to a tendency for concentration of external trade in a few hands and recurrent attempts at more or less complete monopolisation. These were (in the main) resisted by the Governments before the war but during the war itself the Governments themselves initiated far more complete monopolies, under the shadow of which the old-established trading firms were enabled to consolidate their positions. Since the war these monopolies of the main export products have been made permanent in a " socialised " form and have had very important effects on income distribution and private saving and enterprise.

Secondly, Mr. Bauer has made a series of fascinating analyses of these main features, of the motivations behind the successive developments and of the consequences, not always intended or as yet even fully perceived, of the wartime and post-war organisations. His theoretical conclusions emerge on several levels of thinking, in criticisms of Government policies which have occasioned both political and academic controversy; in suggested conclusions of general application to the economics of "underdeveloped" countries; and finally in ideas of even wider relevance to political economy in its old sense of the theory of economic policy.

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[1] *West African Trade.* By P. T. Bauer, Cambridge University Press, 1954. xvi+ 450 pp., 55s.

It is this combination of description and theory which gives Mr. Bauer's book its great value; but it inspires also a criticism. The description and theory are not always clearly separated, so that there is on the one hand unnecessary repetition and on the other occasional uncertainty for the ordinary reader as to what is fact and what is inference. It is, for example, not always clear whether in comparing a controlled with a non-controlled situation Mr. Bauer is describing what *did* happen during a period of free trading or what he believes *would* have happened if such a period had occurred. Admittedly the whole field is complex, but I believe a different and clearer arrangement might have been possible.

Much of the book is concerned with practical criticisms of the policy of the West African Governments. With the main line of these (and speaking as one who had some share of responsibility for many of the policies he attacks) I have no quarrel. No reasoned reply has yet been forthcoming to his deadly analysis of the lack of thought about the meaning of the "stabilisation" which has been the ostensible object of the post-war Marketing Boards; still less about its longer-term implications. I would agree also with his conclusions that the war-time marketing schemes carried the mechanisms of control, licensing, etc., unnecessarily far even for the declared purposes of those controls. He does, however, seem to go too far in his questioning of the basic necessity for the war-time governmental export monopolies. He contrasts the alleged case for the first cocoa monopoly—the danger of excess supplies—with the alleged case for the oil seeds—the danger of inadequate supplies—and asks if the same remedy was really appropriate to both. The inconsistency is, however, more apparent than real. It is true that the immediate object of preventing a collapse in cocoa prices in 1939–40 could have been achieved by a simple price guarantee, but even then the possibility of a sudden reversal in the demand situation was in mind and actual Government purchase seemed desirable both in order to facilitate the organisation of storage and with the reasonable object of ensuring that whoever took the risk of guaranteeing a floor price should benefit if, as indeed happened, market prices subsequently moved up. In the case of both cocoa and palm products there were also periods when United Kingdom and American prices diverged but when it would have been impossible, for reasons of shipping control if no others, to allow ordinary trading competition to even out the differences, and a single selling agency presented itself as the easiest, if not the only, mechanism of averaging the proceeds. Again, the criticisms of " underpayment " by the Ministry of Food ignore the consideration that, at any rate in the war period itself, shipping services without which none of the produce could have moved at all were being supplied by another agency of H.M. Government at equally arbitrary rates. It is anybody's guess who would have come out best if the price mechanism had been left to determine all war-time prices.

Turning now to the wider issues I would distinguish among Mr. Bauer's many suggestive ideas four matters of particular significance: the importance of trade in an apparently " underdeveloped " society; the characteristics and motivations of Government interventions; the analysis of " stabilisation "; and the wide-spreading potential influence of socialised marketing on income-distribution, investment and social structure.

Mr. Bauer has brought out admirably how misleading it is to think of an underdeveloped economy as necessarily unaccustomed to the mechanisms of exchange. It would appear that the average West African is not less but more actively conscious of market forces than the average Englishman. Precisely because his money income is so small it matters to him acutely how many lumps of sugar he can buy for a halfpenny. The importance of trading activity is obscured by official figures of occupations because so much trading is done on a part-time basis by farmers and others. It is West Africa which today may claim to be the famous nation of shopkeepers. One point of special interest is that trading is actually more, not less, important because of the shortage of capital which is the real distinguishing characteristic of underdeveloped areas. People who lack storage space need correspondingly more trading outlets for both purchase and sale.

The next topic of significance is of wider application, because the motives which prompt attempts by Governments to control markets may operate in all communities. Mr. Bauer's analysis of these motives in West Africa is incomplete and, I suspect, unsatisfying to himself. There have been many strands in it; a generous-minded concern about the impact of non-African traders on supposedly primitive Africans, leading to a distrust of all private trade, African as well; an acceptance of the inevitability of monopoly and a consequent feeling that it would be better under state control; a similar genuine conviction of the need for control in abnormal conditions; a disproportionate influence on economic policy by agricultural experts who, like most technologists, take so-called efficiency rather than exchange value as their primary guide; the impatience of the tidy administrator with " new entrants " who disturb a familiar pattern; in some instances the sheer love of power; and the pervasive feeling of inter-war social philosophy that private enterprise is outmoded, sharpened very occasionally by a nodding acquaintance with the theory of imperfect competition and its delusive pseudo-consequence that it really doesn't matter whether there is any competition or not. What Mr. Bauer failed to find, and what I suspect still worries him, is any evidence of a rationally thought-out programme of state intervention. Consequently, although he does his best to be fair to the authorities concerned, he cannot entirely conceal his suspicions that either a deep plot or sinister commercial influence played a crucial part. Those more familiar with the process of Government will find less difficulty in believing in honest irrationality.

Mr. Bauer's analysis of the ambiguities of " stabilisation " is already familiar from articles he has published earlier, alone or with others, and it is unnecessary to do more than note the contribution he has made to the practical study of stability of income for primary producers by highlighting the differences between stability of price and stability of money income and between stability of money and real incomes and by the search for a formula which will take account of long-term price trends while softening the impact of short-period changes.

Less publicised hitherto, but of greater ultimate importance, are the effects of the post-war bulk marketing arrangements in facilitating the withholding from the producer of large proportions of the export earnings of his production. One particular consequence, the piling up of sterling balances, has been rather superficially represented as a new form of Colonial exploitation. This ignores the fact that the decisions leading to these accumulations have been entirely local, not dictated by the United Kingdom Government, that the balances remain entirely at local disposal and that very similar accumulations have taken place in periods of high prices in countries like Malaya where there has been far less diversion of income from private to public hands. What is of far greater importance is that the process has transferred a very large part of the inevitable surplus from private into public hands; it has, for good or ill, greatly increased the part to be played by Government in investment and development and restricted the growth of private entrepreneurship; and it has transferred the control, and to some extent the benefits, of expenditure from the peasant or farmer class to the embryonic white-collar and professional classes in the towns. Innumerable fascinating queries arise. Will the governments in the end invest more than private recipients would have done if the income had gone into circulation ? On the other hand, may there be a loss to national investment in time and eventually in purchasing power, because of the slow procedures of Government spending ? Would such objects as higher education have fared so well under a different system ? and so on. Whatever the answers there can be no doubt that the influence of the marketing boards in facilitating the " socialisation of saving " and of investment may be one of the major influences on the development of society in West Africa and indeed in other British tropical dependencies too.

There is indeed a remarkable contrast between the effective political and economic policies of the British Imperial power in Africa of recent years. Politically a new governing class—necessarily a new oligarchy, as Sir Ivor Jennings has pointed out in his recent broadcast talks—

has been created and power transferred to it with a speed which would have seemed incredible even a decade ago. Economically, the emergence of an economic oligarchy of entrepreneurs, the class which in Western countries has been the natural seed bed of democratic leadership, has been hampered and restricted in countless ways. Instead of handing over political control to people who have learned how to manage their own economic affairs, Britain is in West Africa handing over unusually large economic control to people who have learned merely to operate the forms of a political system. It may be that that is the better order of events but I am certain that it is not a programme of social development resulting from coherent and rational thought. It is rather the accidental product of a chance combination of motives and actions. It contrasts strongly, for instance, with the order of developments in the Far Eastern or in most of the American colonies.

This indeed is an example on the widest stage of the theme which is suggested at so many points of Mr. Bauer's studies, the theme of the accidental and unintended results of Government actions. The Government statements which heralded the birth of the post-war marketing boards in West Africa contained little foreshadowing of the policies they have in fact pursued or of the wider implications of the taxation policies for which they prepared the way. Once created, these organs inevitably began a life and growth of their own. In matters of more detail Mr. Bauer shows how cocoa-grading policy has resulted at certain points in the Boards paying premia for cocoa which commands no higher price in the world market and consequent diversion of effort into activities which add to personal but not to national income. Again, looking to the larger stage, the part played by the limitation of incomes and of imports in the Accra riots of 1948 was of the greatest political importance. Always the lesson is that the framing of policy should take account, so far as knowledge and political pressures allow, of the remoter as well as of the nearer consequences of economic action. The highest value of Mr. Bauer's studies is that for those who care to read them they both re-emphasise that lesson and add significantly to the knowledge of the consequences which may flow from certain types of action. Above all, I suggest that they bring out the importance of remembering that economic policy is a branch of politics, not a disembodied technical operation, that it is influenced by political objectives and has far-reaching political effects. There is more than a difference of nomenclature between "economics" and "political economy", and a reversion to the combination of studies implicit in the title of the London School is perhaps overdue if we are to have fewer of the uncalculated effects described by Mr. Bauer.

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Book Reviews

A Study of Saving in the United States. By RAYMOND W. GOLDSMITH. Princeton University Press. London: Geoffrey Cumberlege. 1955. Vol. I—Introduction; Tables of Annual Estimates of Saving 1897 to 1949. xxx + 1,138 pp. Vol. II—Nature and Derivation of Annual Estimates of Saving 1897 to 1949. xxiv + 632 pp. Vols. I and II. £12.

Individuals' Saving. By IRWIN FRIEND with the assistance of VITO NATRELLA. John Wiley & Sons, Inc., New York. Chapman & Hall. 1955. x + 288 pp. £2.

In his considerable work, Dr. Goldsmith provides a detailed statistical review of the trend of total saving in the United States, and of every imaginable constituent of saving, from 1897 to 1949. The study was sponsored, and largely financed, by the Life Insurance Association of America, and their enterprise in recognising the usefulness of research on this scale should be acknowledged.

The major task of Dr. Goldsmith and his collaborators was to assemble the statistical data. The 860 pages of tables which make up the bulk of Vol. I can be regarded as an abstract of financial statistics for the United States. But they are much more than a source book; they show in detail the translation of basic series into social accounting concepts, with adjustments and extrapolations revealed and explained. Dr. Goldsmith holds that any study like this, in which a great amount of estimation and judgment is applied to often scanty " hard figures ", should make explicit each step in the processing. The size of the book is a witness to the implications, in terms of cost and paper, of applying this principle.

The author is the first to point out that these volumes only begin to build up the analysis of the statistics. The first volume includes a summary description of the trend of saving in relation to economic growth and business cycles and discusses, rather briefly, the determinants of saving. The second volume contains a discussion of the conceptual problems of measuring savings and a critical analysis, of the greatest value for every user of American financial statistics, of the series employed and of the steps taken to overcome their weaknesses. A third volume is promised, containing material on national wealth, on certain other statistical sources for estimates of saving, and " some simple econometric experiments " with the statistical material.

The basic method adopted is to measure savings from changes in each category of assets and liabilities, physical and financial, for each sector of the economy, on social accounting principles. This is the method used in the official statistics of personal saving currently published by the Securities and Exchange Commission and the Department of Commerce. But Dr. Goldsmith holds that the S.E.C./Commerce figures are significantly too low, especially in the post-war years. The major reasons are: they exclude net purchases of unquoted securities (an important source of finance for small and medium corporations), understate builders' profits and dealers' commissions on purchases of real estate, and use excessively short lives for agricultural fixed capital. For 1946–49, Dr. Goldsmith reckons personal saving at $57 billions as against $34 billions in the comparable official estimates, and the reasons given for the difference presumably still hold after 1949.

Although Dr. Goldsmith comments with dismay on the gaps in the United States statistics—the " astonishing " absence of any information on holding of currency by sectors and the " scandalous ignorance " about assets and liabilities of unincorporated businesses—the foreign reader is, rather, astonished by the wealth of information that can be got, and by Dr. Goldsmith's ingenuity in using it. For example, one finds tables showing the assets of private pension funds going back to 1920—a subject not considered to justify statistical investigation here until three or four years ago. It is the mass of data already available in one form or another, not only in official series, but in statistical compilations by business organisations and private researchers, that has made it possible for Dr. Goldsmith to take back to 1897 his analysis of changes in each form of asset or liability. Often enough, this involves extrapolated series which would not individually stand analysis. But such dubious extrapolations are the exception. The broad lines of development are firmly enough established by reliable data.

There are two important features of the method of measurement of personal saving—the form of saving to which the bulk of the work is devoted, since it represents a very stable two-thirds of total saving. First, personal saving is taken to include purchases both of houses (which is usual in social accounting) and of cars and other durable goods (which are usually treated as consumption). It is clear from the analytical essay that the long-term ratio to income of total saving, including durables, is remarkably constant over the half-century; but if durables are excluded from saving, there is a clear downward trend. Purchases of durable goods should thus be considered either as a form of saving or, with income, as a major determinant of monetary saving. The same point emerges from the sample enquiries into saving conducted by the Oxford Institute of Statistics.

Secondly, Dr. Goldsmith boldly attempts the separation of the savings of unincorporated businesses. In fact, however, he cannot go further than identifying changes in the physical assets, and certain kinds of monetary assets, of such businesses. He has found no way of estimating the extent to which proprietors reinvest their own savings in the business (or their withdrawals). On this basis, unincorporated businesses contribute very little to total saving. Whether such a partial separation of the assets of unincorporated businesses is worth while is open to question.

In these volumes, no attempt is made to analyse the effect on personal saving of changes in different *kinds* of personal income. Yet there is some evidence, at least for the United Kingdom, that short-term changes in monetary saving can be traced to changes in profit incomes (both entrepreneurial income and interest and dividends) rather than to changes in total personal income (although this may not apply to purchases of durable goods).

Dr. Goldsmith's work provides the material for analysis of United States saving behaviour which should be of universal interest. A similar historical analysis is probably impracticable in most other countries, since the basic data do not exist and cannot now be got. But Dr. Goldsmith shows some of the ways in which the development of statistics of capital flows should proceed in any advanced country where study of the volume and composition of saving is taken seriously.

Dr. Friend's book on individuals' saving in the United States covers some of the same ground as Dr. Goldsmith's. It is principally a description of current statistical sources (1933–52), and is thus more up to date as well as more convenient in bulk and (relatively) in price. But the critical discussion is less thorough.

Three methods of estimating personal saving are used in the United States. The first is the excess of personal income over current expenditure, as shown in the national income statistics. The second is the balance sheet method of the S.E.C./Commerce statistics, the method principally used by Dr. Goldsmith. The third is the sample survey method (essentially, also, a balance sheet approach) used in the survey of consumer finances conducted by the University of Michigan for the Federal Reserve Board. Dr. Friend compares and assesses the results of the three methods. Between the first two there is a fair measure of agreement, notwithstanding substantial differences in individual years. This agreement is, however, endangered if Dr. Goldsmith's view that the S.E.C./Commerce figures understate saving proves justified. The Michigan sample surveys show a distinctly lower level of saving, largely, it seems, because they understate income, especially of the groups with the highest propensity to save. But sample surveys are justified as the only way of analysing in detail the relative savings of different income groups, or of different occupational groups.

In Dr. Friend's view, the S.E.C./Commerce series is probably the most firmly based and offers the greatest hope of improvement. It must, however, be emphasised that this method, although to a less extent than the income minus expenditure method, incorporates a large element of estimation by residue. The method of estimating personal saving in the form of currency, bank deposits, Government securities and other securities—which together account for half the gross increase in assets (in 1952, excluding durable consumer goods other than houses)—is first to estimate the increase in the total " stock " of the asset and second to estimate and subtract increases in holdings by corporations, public authorities and foreigners; changes in holdings of the personal sector are thus derived as residues. There are considerable elements of doubt at each of the first two stages.

Dr. Friend's general analysis of the course of saving is broadly in agreement with Dr. Goldsmith's. Both come to the conclusion that the ratio of personal saving, including durable goods, to total disposable income appears to be fairly constant in the long-term, while one must remain, as yet, agnostic about the systematic determinants of short-term, changes in saving.

C. T. SAUNDERS.

Retail Trading in Britain 1850–1950. By JAMES B. JEFFERYS. Cambridge University Press. 1954. xvii + 497 pp. 50s.

The author writes that the main subject of his enquiry is " the growth of multiple shop retailing " on which he has assembled a good deal of statistical data. A pleasing feature is that the provenance of the data, the method of making the estimates and the sources of possible error and bias are discussed at length. The main statistical findings may be summarised as follows: the co-operative societies, department stores and multiples together handled 12 per cent. of all retail trade in 1900, 20 per cent. in 1920 and 34 per cent. in 1939; the multiples alone handled, 4, 9 and 19 per cent. in the three years. Estimates are also presented for separate branches of retailing. It is useful to have these careful estimates to take the place of what at best had been very general impressions.

The statistics on the shares of trade handled by the four broad groups of retail firms are undoubtedly the most satisfactory part of the book. The rest of the discussion, dealing mainly with past developments in particular branches of retailing as well as in the retail trades in general, is less satisfactory, though it contains much that is new and of interest to economists and economic historians and though several of the points and suggestions made by the author are illuminating (e.g. on pp. 81 and 97). However, too often sketchy treatment skims the surface of a topic, and the careful reader would like more information, more explanation and, sometimes, an indication of which of apparently contradictory statements is to be given preference. Moreover, large parts of the work are likely to be of somewhat limited value as a contribution to economic history because of a meagreness (often absence) of documentation or supporting illustration which requires the reader to take many generalisations on trust. It may be added that several of these generalisations require qualifications which would rob them of much of their point. The deficiencies of the treatment may be illustrated by means of four examples, relating to different aspects of competition, one of the topics in the book of special interest to economists.

(1) In one place it is stated that price competition in the last quarter of the nineteenth century was intensified by " the general trend of falling prices " (p. 38). It is not stated here that price competition continued during that period even in years in which wholesale prices were rising, or that it became even more severe in several branches of trade during the two decades before 1914, a period largely of firm or rising wholesale prices. It is true that in another chapter it is stated that the grocery trade was " highly competitive in the two decades preceding the First World War ", and then " the rise in the prices of foodstuffs " is given as one of the reasons for it (p. 131). (This seems to refer to *price* competition, though it is not stated specifically.) No attempt is made to explain why, and the process by which, changing price levels (often slowly changing price levels) affected retailers' price policies, nor why falling prices at one time and rising prices at another were conducive to competition. (2) Statements on the early origins of resale price maintenance (on p. 38) are not supported by detailed illustrations. However, there is a footnote reference to an article which reaches conclusions which do not support some of the statements in the text. Moreover, the comment that the book trade had " somewhat special circumstances " arouses interest, which is disappointed because these " special circumstances " are not explained in a later chapter dealing with the book trade. Indeed, virtually all the reader is told about the Net Book Agreement is that it started in 1900 (p. 283). (3) From the discussion on pp. 133–4 the reader is likely to conclude that in the grocery and provision trade in the nineteenth century there was little or no selling on credit or delivery of goods to customers. However, credit trading was widespread in the nineteenth century. One of the main tendencies in the development of retailing (including grocery retailing) during the first two-thirds of the period indicated in the title of the book was the gradual and partial replacement of credit by cash trading, a theme which is neglected in the book. The early working-class co-operative societies were founded in part (to quote an early comment) " to break down and destroy the system of credit ". Again, the middle-class co-operative societies in London, which Dr. Jefferys merely mentions, stressed and demonstrated the reductions in gross margins which could be effected by selling for cash only instead of giving long credit, and by eliminating the customary delivery services or

making customers pay for them. (Groceries and provisions were among the principal classes of goods stocked by both working-class and middle-class co-operative societies in their early years; the shops of the middle-class societies, however, rapidly developed into department stores.) (4) It is stated that in the inter-war years there was a decline in price competition between retailers following, in part, " the adoption by retailers of traditional and agreed markups " (p. 96). There is no specific account or illustration indicating the locality, trade, goods, rate of mark-up, effectiveness and duration of any one particular " adoption ". It is also not explained, for example, how " traditional and agreed markups " can eliminate price competition if different retailers buy at different prices. The reader is likely to be puzzled by these omissions because at several places in the book there are references to price competition in trades which in the inter-war years were not covered by extensive and effective price maintenance enforced by manufacturers (e.g., pp. 70, 194, 222, 231 and 261–2). Other examples (e.g., from the grocery and licensed trades) which are not mentioned in the book could be added. This is not to say that there were no informal agreements or understandings on *prices* among competing retailers in some localities. But it is not likely that these were more numerous, effective and lasting than similar arrangements before 1914; and there is no need to try to explain them in terms of " traditional " or " agreed " *mark-ups*.

References to methods of organisation and operation used by different categories of retailers are woven into the narrative. Much of this is interesting, but general statements tend to give an unwarranted impression of uniformity. There are also examples of loose writing. The reader is told that in the inter-war years " policy decisions " in department stores "were more frequently [than before 1914] the result of the application of scientific business principles by a team of experts " (p. 60). The nature of the "scientific business principles" which had eluded the business man before 1914 is not explained, nor the precise meaning of decision-making by a team of experts. Moreover, the high rewards commanded by successful buyers suggest that in what is possibly the most important activity in retailing the individual was still more important than the system or the " science ".

In spite of the shortcomings of the book, the enterprise of Dr. Jefferys in attempting to chart the course of retail trade over the last 100 years is wholly commendable. It may well be that the comparative neglect of the subject may have tempted the author to try to cover too much ground all at once. However, the sketchiness of the treatment and the scarcity of illuminating detail are perhaps not fully compensated for by the comprehensive scope of the book. It is to be hoped that the work will encourage others to make more detailed studies of some of the many topics which find a place in it, and that Dr. Jefferys will not desert the field in which he has already done so much.

In conclusion, it may be added that the book is not solely concerned with the past. In several places there are forecasts of developments in the next few decades. These are largely projections of current developments, modified by the author's interpretation of the effects of what he considers to be the underlying long-term forces. These forecasts are interesting and stimulating, though, as with almost all forecasts, the reader may not always be convinced. (To take a small example, it is doubtful whether an extension of branding in the fruit, vegetable and fish trades " with or without resale price maintenance " would improve the competitive position of the smaller shop " that is closer to the consumer ", as is suggested on p. 252.)

B. S. YAMEY.

Uncertainty in Economics and other Reflections. By G. L. S. SHACKLE. Cambridge University Press. 1955. xv + 267 pp. 25s.

In this collection of essays Professor Shackle reveals himself as a man of wide interests in economic theory and of varying moods. We meet him as the creator and expositor of his own ingenious theory of expectation; as a contributor to the theory of interest rates and to the theory of the multiplier; as the clarifier and surveyor of other men's theories; and as the teacher of economics, speculating on improvements in the syllabus, the qualities of the good economist, and the mental training that economic education affords. We see him calm and cool as he builds his models brick by brick, and impassioned and eloquent as he describes the joys of economic theorising and of mathematical argument. In either frame of mind the elegance of his style and the clarity of his exposition cannot fail to arouse admiration.

Professor Shackle is least convincing when he tries to show that not only is his theory of expectation a plausible one but that alternative approaches by way of the theory of probability are misguided if not downright wrong. His dismissal of probability theory as irrelevant to a single crucial decision seems to stem from confusion between a legitimate contempt for some of the more naïve uses of the theory in such a context and the mistaken contention that probability tells us nothing about the consequences of such a decision. There is something slightly old-fashioned about Professor Shackle's attitude to probability and statistics and a musty atmosphere of classical large-sample analysis and the law of large numbers seems to hang about his discussion of these topics. To accept his point of view would make nonsense of the recent applications of probability theory to stochastic processes and would rob economists of the inspiration which the statisticians' independent approaches to decision-making provide.

Whether in the present state of knowledge we prefer potential surprise to probability is a matter partly of introspection and partly, as Professor Shackle hints in another context, of æsthetics. It is scarcely a question of logic. Whether in the future one approach or other should be discarded will depend on the possibility of empirical refutation; or in other words, on the failure of one theory to explain an observable phenomenon. The chink in the armour of potential surprise revealed by its failure to explain the diversification of assets has not received any further patching in the present book.

Professor Shackle is a stimulating and original writer, whose rare power of insight gives life and interest to any topic that he discusses. I hope that in his proper anxiety to stretch out his hand to psychology he will not find it necessary to turn his back on probability and statistics.

A. D. ROY.

The Story of F.A.O. By GOVE HAMBIDGE. Macmillan & Co. Ltd. 1955. xii + 303 pp. 48s.

This history of the first ten years of life of the Food and Agriculture Organization of the United Nations is written by a man who has been its Director of Information and is now its North American Regional Representative. The story is one of considerable interest to economists. The development of F.A.O. over these ten years has one most striking feature, which is brought out clearly in this book. The Organization started out with far-reaching plans to marry improved nutrition to agricultural prosperity—plans which involved buffer stocks, commodity control schemes, " mutual aid " in surplus foodstuffs, and even an F.A.O. interest in domestic full-employment policies because of their effect upon the demand for food. This idea of bringing profits to agriculture by stimulating demand rather than by restricting supply, showed itself in such early suggestions as that of the World Food Board, proposed in 1946, or the International Commodity Clearing House proposed in 1949. It was always questionable whether a body set up to deal exclusively with Food and Agriculture should go so far into matters of general commercial and financial policy; but in any case these ideas are now dead, and the F.A.O. has in fact concentrated on technical assistance in the realms of nutrition and agriculture. The present international attempts to communicate the techniques of the advanced and skilled countries to the " underdeveloped " countries of the world constitute one of the most important and remarkable revolutions of our time. The second half of this book is devoted to a detailed catalogue of the contribution of F.A.O. in its sphere to this movement. This account illustrates vividly the immense range of activities in this work; but it does not, perhaps, give sufficient emphasis to, or analysis of, the cases in which the F.A.O.'s efforts have been unsuccessful. A scientific and impartial assessment of failures and successes would be of special interest to economists and other technicians in this field. But this book is a more or less official " success story ".

J. E. MEADE.

Economics and Action. By PIERRE MENDÈS-FRANCE and GABRIEL ARDANT. W. Heinemann. 1955. 222 pp. 15s.

It is not unusual to find high civil servants like M. Gabriel Ardant dealing with economics and economic policy, but it is very exceptional to find an outstanding statesman and ex-Prime Minister contributing to a book on economic theory and policy. M. Mendès-France has already proved his great interest in and knowledge of economics by his work as president of the " Commission des Comptes et des Budgets Economiques de la Nation ", and also as chairman of the Finance Committee of the French National Assembly.

The first part of the book is concerned with the " Problem of Equilibrium ". A short survey relates the evolution of economic analysis on this subject, pointing out some of the defects of the classical theory, but acknowledging what is still valid. A considerable improvement on mercantilist thought was brought about by the French physiocrats and the English classical school, and the system of economic freedom which they advocated is, in some respects, not completely out of date. Nevertheless, recurrent economic depressions accompanied by unemployment were not accounted for in the classical approach, and Say's law was found wanting. Keynes' contribution to the theory of employment is of great importance, not only for the progress of economic analysis, but also for better economic policies. P. Mendès-France and G. Ardant draw attention to the importance of controlling investment in solving the problem of depression and base part of their argument on the results achieved by the New Deal. They recommend, too, a decrease in interest rates and a budget deficit. Inflation is also dealt with in a Keynesian approach. But to carry out successfully an economic policy aimed at maintaining equilibrium between production on the one hand and consumption and investment on the other, one needs an accurate system of national accounts. It is very comforting to know that M. Mendès-France urges the development of research in this field, in which he has already done much work at the " Commission des Comptes de la Nation ".

In Part II, the problem of choice is explained in the light of the price mechanism, and the authors reach the conclusion that a system of controlled economy cannot ignore it with impunity, especially in rationing and price fixing. By studying the structure of markets, they demonstrate that complete freedom might lead to cartels and restrictive practices which destroy competition to the disadvantage of consumers. Government intervention aimed at breaking up these " ententes " derives from a liberal inspiration. M. Mendès-France believes that government action in economic affairs should defend the maximum freedom of the consumer so as to preserve the incentives resulting from true competition. We read in Chapter V, Part II: " The systems of controlled (dirigée) economy, which " represent an intermediate—or mixed—solution, consist, or should normally consist, of a series of interventions aiming not only at preserving the capitalist management of property, but also at leaving the individual a field for free action " (p. 201).

On the whole, this is an interesting and convincing book which, without breaking new ground, has the great merit of bringing the economist and the statesman together and forcing each to recognise the importance of the other. Those who wonder what is the use of economics may read this book with profit. Finally, it must be pointed out that the authors are not " doctrinaires " and have used an empirical approach in their attempt to find remedies capable of bringing about a situation of general economic equilibrium. We must be particularly grateful to P. Mendès-France and G. Ardant for a book which might be an answer to those Frenchmen who have not yet understood the direct relation between economic analysis and economic policy.

MAURICE NIVEAU.

The Redistribution of Income in Post-war Britain. By ALLAN M. CARTTER. Yale University Press. 1955. xii + 244 pp. $5.

Mr. Cartter classifies 23 million tax families according to their income as recorded by the Commissioners of Inland Revenue for 1948 and finds 39 per cent. in the range £135–£250, 37 per cent. in the range £250–£500, and 3 per cent. over £1,000. He then distributes £4,000 million of taxation and benefits according to the income class. For the third of taxation which is directly levied on personal income the task is easy, for the remainder difficult. One quarter of taxation is on undistributed profits or on wealth and one doubts if the complex allocation of wealth according to the income group of the owner and of undistributed profits as if they constituted personal income is either justified or worth the trouble involved. The subsequently published results of the income census suggest, on the basis of investment income, that a greater portion of wealth is owned by those with over £1,000 income. Two-fifths of taxation is indirect, most of it levied on alcohol and tobacco, and again there are great problems of its distribution. Many would not agree that the pre-war distribution of expenditure on taxed commodities is " quite well documented ", the best, and almost the only, good pre-war survey being totally inadequate as a record of expenditure on tobacco and alcohol, and there is only " scanty information . . . in the postwar years ". On the expenditure side only two-fifths of government revenue could be allocated as benefiting specific income classes, including cash transfers, subsidies, health and education. The surprising feature is that benefits per family worked out at about £70 per annum in all income groups.

Despite the above criticisms, intended to suggest the impossibility of doing satisfactorily what Mr. Cartter attempted, the book is very welcome and the aggregate results seem reasonable. The danger is that because of inability to do anything better and in the absence of alternative estimates the detailed results will be widely quoted and generally accepted, as for example the figures of the incidence of indirect taxes.

Taxation and government expenditure do not only discriminate according to income and a small valuable section of the study discusses the effect of income tax allowances for dependents. Three-quarters of the incomes are in the range £135–£500, persons with from £135 to £250 are typically single, most of those with from £250 to £500 are married (the ratios of wives to incomes are 0.33 and 0.61 respectively), so that a comparison of these large groups should show something of the relationship between family responsibility and redistribution. In 1948 a married man with one child and £350 a year paid 2 per cent. as income tax, a single man with £200 paid 4 per cent., a regressive tax as usually reckoned, but this effect is obscured in this study, for income tax is shown as progressive in these two income ranges from 1 to 4 per cent. It may be too that the character of expenditure changes so much after marriage, less beer and tobacco, more rent, fuel and food, that there are discriminating effects from indirect taxation; but again the study shows no sharp changes in the character of expenditure as one compares the two ranges between £135 and £500. It may be that for the majority of the population it is more important to analyse taxation according to family responsibilities than according to income. It needs no study to show taxation is extremely progressive for the 3 per cent. of the population with over £1,000 a year.

A striking feature relative to this book is that when published, money national income was 50 per cent. greater than in the period to which the study relates, a reflection on our inflationary economy rather than on the book. If all items had risen correspondingly it might be reasonable to assume relative positions unchanged, but in the same period the amount raised and used by the government rose only 30 per cent., but included a doubling of expenditure on military defence and an increase of only 11 per cent. in subsidies and cash benefits to persons. Have these factors influenced the extent of the redistribution ?

H. S. BOOKER.

Essays in Public Finance and Fiscal Policy. By GERHARD COLM with the editorial assistance of HELEN O. NICHOL. Oxford University Press, New York. 1955. xvii + 375 pp. 38s.

The name of Dr. Colm is associated in the minds of a great number of economists with his writing on fiscal policy bred of long study and practical experience as a member of the Council of Economic Advisers in Washington. Inevitably, therefore, this collection of essays written between 1934 and 1954 will be read in this light.

To the practising economist, Colm's essays on the application of economic theory to fiscal policy are interesting more for their record of the evolution of the " new " public finance than for the instruction they offer. The very success of Colm and others in establishing the right of Keynesian economics to guide policy must mean that the reader finds a great deal that is familiar in about half of the 18 essays. The outstanding quality of these essays is, however, their detachment and thus the full realisation of the conflict of objectives associated with fiscal policy. This is particularly well illustrated in his major essay on fiscal policy and the federal budget in which he demonstrates the difficulty of reconciling the requirements of legislative and administrative control with the demand for a smoothly working anticyclical policy (pp. 200–19). We must also be grateful for the translation from the German of Colm's excellent exposition of the changes wrought in the presentation of budgetary data in the light of fiscal policy.

There are a number of essays in this volume which remind us that Dr. Colm was a well known writer on public finance long before Keynesianism became fashionable. His essays on the more traditional problems of public finance, such as the equity of the tax system, and the theory of public expenditures, demonstrate how dangerous it is to base a theory of public finance on narrow utilitarian foundations while at the same time supporting a democratic system of finance. As he warns us, " a judgment about the justice of a tax or tax system presupposes . . . a historical-political interpretation of the existing state and society ". Dr. Colm's essay, " Why Public Finance ? " and his discussion of the theory of public expenditure should become compulsory reading for students of public finance. These essays form a useful complement to Myrdal's chapter on public finance in his recently translated *The Political Element in the Development of Economic Thought*.

ALAN T. PEACOCK.

Sampling Methods for Censuses and Surveys. By FRANK YATES. Second edition. Charles Griffin and Co. Ltd. 1953. 401 pp. 38s.

Sample Survey Methods and Theory. By MORRIS H. HANSEN, WILLIAM N. HURWITZ and WILLIAM G. MADOW. John Wiley & Sons, Inc., New York. Chapman & Hall. 1953. Volume I: Methods and Applications. 638 pp. 64s. Volume II: Theory. 332 pp. 56s.

The refinement of the theory of sample surveys has without doubt been one of the most fruitful products of statistical science. In the study of human populations it has made the collection of data on an accurate and representative basis much more feasible and has given a tremendous stimulus to empirical research in the social sciences.

For many years, the student wishing to acquaint himself with sample survey theory had to refer to papers spread throughout the journal literature, so that it was not easy for him to see the subject as a unified whole. But, inevitably, the spate of papers was followed in due course by a spate of textbooks. Until six years ago, there was no textbook—in the English language—

devoted to the subject, while now there are five of major dimensions; more are no doubt on the way.

Of these five, Yates' *Sampling Methods for Censuses and Surveys* was the first to appear, in 1949, and it is fair to say that in these few years it has established itself as a classic of statistical literature. The outstanding merit of the book for the student lies in the logical manner in which different aspects of sample design are presented. Thus, as much in the general chapter on the structure of samples as in the technical chapters dealing with the estimation of population values, the estimation of sampling error, and with efficiency, the unity underlying sample design is brought out. A number of the results presented in the first edition were new at the time and have had important applications in sample design.

In the second edition, here under review, two new chapters and a supplementary bibliography have been added, while the remainder of the text has been left unchanged (apart from minor corrections). The first new chapter deals with the critical analysis of survey data, that is with the situations in which one is interested less in estimating the overall characteristics of a population than in studying the relationship between different variables and in making comparisons between different parts of the population covered. The other new chapter brings together a number of miscellaneous developments since the last edition; it contains, among other things, a critical discussion of the use of sampling in the 1951 Census of Population.

The second book under review bears the strong imprint of the U.S. Bureau of the Census, within which its three authors have been responsible for many contributions to sampling theory and design. The division into two volumes is useful and interesting. " Volume I gives the principles and methods of sampling and their applications to various types of problems. Formulas appropriate to the methods presented are given without proof. Volume II contains the fundamental theory on which sampling methods are based, together with derivations of the formulas and proofs of statements made in Volume I." The authors have thus in a sense written two textbooks, each of which can stand by itself; they are to be congratulated on a major achievement.

A comparison of this book with Yates' text has limited value, since the two are addressed to rather different audiences; but a few general points are in order. In the first place, Yates' book has chapters on practical aspects of surveys—e.g., questionnaires, interviewing, machines—which the American authors explicitly exclude. Conversely, the second volume of Hansen, Hurwitz and Madow is taken up with fundamental theories and proofs, which are not covered by Yates and are of interest primarily to the specialised reader.

From the point of view of the statistical student in the social sciences, the American text has one advantage and one disadvantage—apart from price—over Yates' volume. The advantage is that its presentation is illustrated by examples taken from demographic, commercial, social and economic surveys which, to the social scientist, are a little easier to follow than some of the agricultural illustrations in Yates' book. The main disadvantage of *Sample Survey Methods and Theory* for the student arises from its very detail and comprehensiveness; for the student it is vitally important to see the wood as well as the trees, and this task is more easily accomplished with the help of Yates' book (or, on the theory, with Cochran's *Sampling Techniques*) than with the exhaustive text by Hansen, Hurwitz and Madow. But, lest this should discourage the student from tackling their book, let me add that the first two chapters in Volume I contain a particularly good introductory account of the basic principles of sampling. I should also like to note the valuable treatment of non-sampling errors, an aspect of surveys which is rightly receiving increasing attention.

C. A. MOSER.

Oxford Economic Atlas of the World. Oxford University Press. 1954. viii + 265 pp. 30s.

Kultur-Geografisk Atlas. By J. HUMLUM. Volume I: Atlas. Copenhagen. Gyldendalske Boghandel Nordisk Forlag. 1954. xx + 127 pp. Kr. 23·50.

Both volumes represent interesting attempts to meet the need for a handy yet comprehensive and reliable economic atlas suitable for use both by students and the general public, by no means an easy task. The *Oxford Economic Atlas* has two principal sections. A series of world commodity maps and diagrams in which the patterns of production and trade of some 150 commodities are clearly illustrated is followed by a well arranged country by country index which includes statistical summaries of population, land use, production and trade, with comparative figures for pre-war (1934–8) and post-war (1948–50 or 1949–51) periods. An impressive amount of data has been assembled and set out in readily accessible form. The maps, which employ the now well known Oxford equal area projection, are clear and suffer only from the rather small page size. Only minor and occasional omissions and mistakes may be noted. This atlas is a remarkably complete and accurate production which will meet with wide acceptance.

Humlum's *Atlas of Economic Geography* is presented in two volumes, for atlas and explanatory text are bound separately. Only the atlas is available for review. The atlas may be widely used since explanatory matter is given in German, French and English, in addition to Danish. World maps of the production of all the principal commodities entering into world trade are based on Olaf Kayser's equal area projection, but suffer, even more than the Oxford atlas, from the smallness of the scale employed. Maps of production and trade for each commodity appear on facing pages, thus facilitating comparison. The world maps in the Oxford Atlas, which make a serious attempt to show the actual distribution of production for any commodity, are more readily useful than those in Humlum's Atlas which show, diagrammatically, production on a country by country basis. To some extent this is rectified by Humlum's inclusion of inset maps covering in detail the more important production regions.

Both atlases are generally reliable and comprehensive. In particular, the *Oxford Economic Atlas*, together with its companion regional economic atlases now in course of preparation and publication, should become a standard work of reference.

M. J. WISE.

Papers and Proceedings of the First International Credit Conference. ITALIAN BANKERS' ASSOCIATION. Vols. I–III, Rome, 1953; Vols. IV and V, Rome, 1954. Pp. 659, 432, 474, 723 and 477 respectively. Complete set $20.00. Vols. I and IV $6.00 each; Vols. II, III and V $4.00 each.

In October, 1951, an International Credit Conference was held in Rome under the auspices of the Italian Bankers' Association. It was attended by leading bankers, economists, lawyers and other experts from fifty-two different countries, representing both central and commercial banks and a large number of specialist credit institutions. In addition to those actively engaged in the business of banking, a number of academic experts was also invited to prepare papers for circulation and discussion at this Conference. Two groups of subjects were on the agenda—" bank liquidity and the control of inflation " and " the financing of foreign trade ". These five volumes represent the content of these discussions as edited and prepared for publication on behalf of the Association by Mrs. Vera Lutz in two editions—one Italian and one French-English—in order to ensure a wide international circulation.

Vol. I contains the Secretariat's Report, the purpose of which was to introduce the discussions, and which then became the subject of the debates here published. This volume serves as a very full introduction to the more specific studies collected in the succeeding volumes but its interest will be greater for those who attended the Conference than for outsiders. Undoubtedly it contains a good deal of useful material, but even with the aid of the excellent index appended to Vol. V it is a little difficult to find what one wants and heavier cutting would have been an advantage.

Vols. II and III, on the other hand, are devoted to a large number of specific studies of countries, grouped in the respective volumes as European and non-European. Nowhere else has so much information been assembled about the banking systems of so large a number of countries. Many of these contributions have been published in French, without English translation, and this must limit their usefulness in certain quarters, but most of the potential readers of these volumes are assumed to have at least a working knowledge of this language. These two volumes provide, in short, much valuable reference material, both for bankers and university specialists in this field and can be recommended to them most wholeheartedly. Vol. IV, which is still concerned with bank liquidity and the control of inflation, is devoted to papers on " general economic and legal aspects ". The content of many of these chapters would lie outside the range of interest—and, one would think, the understanding—of most practical bankers. To the academic economist, the theoretical sections are less than satisfying; much of the writing is wordy, the arguments not always clear and inevitably there is much duplication between papers. However, one or two authors do attempt a certain amount of comparative analysis and this is valuable. Rather less than half the volume is concerned with specialist credit institutions mainly in the fields of agricultural credit and mortgage lending. Apart from the appended indexes, Vol. V is entirely given over to the papers and discussions on the financing of foreign trade. Some of it is technical in character (e.g., the sections on documentary credits and the unification of the law on bills of exchange), but much of it is descriptive, including some useful material on the sterling area and the means adopted in various countries to assist exports. This will again provide valuable reference material.

Looking at the volumes as a whole, one must give full credit to the enterprise of the Italian Bankers' Association, both in organising the Conference and in publishing the proceedings. At the same time, ruthless editing and more rigorous selection would have enhanced further the value of these publications. One is left, too, with the impression that anybody who stayed the course of this Conference and conscientiously followed these discussions must have been well-nigh superhuman.

J. S. G. WILSON.

A Distribution Model Applicable to Economics. By ARNE JENSEN. Munksgaard, Copenhagen. 1954. 99 pp.

Several schemes have been proposed in the past for systematising the standard probability distributions in terms of a small number of parameters. One of the best known is that due to Karl Pearson. The principal use that has been made of these systems is in fitting distributions to observational data. In the present monograph there is developed a new type of system based on stochastic processes, which in contrast to previous static systems is dynamic in character. In emphasizing the problem of causalities in the applications, the author's viewpoint is likewise in contrast to that of Pearson who has stated that " the best argument for the generalised probability curve is that it does fit, and fit surprisingly accurately observations of an asymmettical character ".

The shorter section on applications does not go beyond illustrating the usefulness of Markov process models in econometrics, brief reference being made to sector analysis, the theory of demand, risk theory and traffic programming. The last mentioned concerns a modification of Koopman's transportation problem which leads in this case to a rather intractable set of equations.

This booklet contains some good ideas but is unfortunately not at all easy to read on account of its somewhat obscure style. With its specialised character it would be profitable only for readers already quite familiar with the theory of stochastic processes.

F. G. FOSTER.

Pools and the Punter. By HUBERT PHILLIPS. Watts & Co. 1955. viii + 127 pp. 8s. 6d.

A memorandum to the Royal Commission on Betting, supplemented by further research, has been made the substance of this book, which sets out to show: (1) that the distribution of dividends to football pool punters conforms to the theoretical distribution to be expected if all bets were made at random; (2) that there is no element of skill in the selection of winning combinations; and hence (3) that football pools are merely a complicated type of lottery, which had better be openly regarded as such by the State and the public, and preferably be run in the form of a State lottery.

Mr. Phillips' blend of arithmetic and enthusiasm has led him to overstate his case in respect of (1)—a rather difficult feat, because it is a strong case. There *is* a high correlation between the theoretical and the observed distribution of dividends: in the case which should be most favourable to the hypothesis, I estimate the squared correlation coefficient at $+\cdot 65$, so that about two-thirds of the variability of the data may be said to be " explained " by the hypothesis. This is strong evidence, but not " staggering ".

Overstatements of this kind may be attributed to the author's failure to do much more with his material than tabulate it (very well) and comment on its leading features. Since he is dealing with samples of at most forty experiences, there is a good deal of random fluctuation in the data, as he is aware, and he is reduced to special pleading to account for the grosser apparent discrepancies between theory and observation. Such matters cannot be decided by the inspection of even the most experienced eye, and a judicious use of statistical tests of his hypothesis would have added considerably to the strength of his case. Mr. Phillips ventures no further into the theory of probability than to calculate an average expectation occasionally; questions of divergence from expectation, of degree of dispersion, are nowhere discussed probabilistically. Thus, while the case for (1) looks convincing in a general way, it needs reinforcement by a more refined analysis.

Even with the simple technique used here, the case for (2) is absolutely compelling. Mr. Phillips has great fun with the popular newspapers' "expert" tipsters. Not only do they predict no better results than random selection: they actually seem to have a tendency to produce worse ones! (But this is probably a short-term phenomenon: I defy even an expert to do consistently worse than a pin.) It is quite extraordinary that most punters remain determinedly unaware of the uselessness of the study of football "form". Here is an example of mass delusion which should fascinate economists, psychologists and anthropologists alike.

Underlying Mr. Phillips' discussion, one senses a feeling of puzzlement at the readiness with which the punters collectively allow themselves to be stripped of half their investments by the promoters and the State (which collects about £25 million in taxation, and an additional large amount through the Post Office). I suspect Mr. Phillips of believing that no rational being in possession of the facts can prefer a chance in five million of winning £25,000 to the certainty of not losing sixpence. In this he is wrong, both theoretically and empirically. Many punters regard the pools as a positive form of insurance, in which one need incur no disaster to be eligible for benefit. There is no irrationality in this, although it probably conduces to the general apathy concerning the management of the pools. Whatever one may think of the nationalisation proposal, one cannot avoid some sympathy for Mr. Phillips' moral fervour against the pools promoters.

ALAN STUART.

Free Trade and Protection in the Netherlands 1816–30. By H. R. C. WRIGHT. Cambridge University Press. 1955. xii + 251 pp. 31s. 6d.

This is a careful study, based to a considerable extent on Dutch archival materials, in a field largely neglected by English scholars. Although its main theme, the detailed fiscal policy of a small country in a short span of years, is highly specialised, the author has had the good judgment to put it in a wider context. More than a third of the book is given up to an account of the economic position of the Netherlands in the late eighteenth and early nineteenth centuries and of fiscal policy and the manner of its administration before 1816. It is an excellent summary and is probably the most useful, as well as the most interesting, part of the book.

The close study of the period of Dutch and Belgian union which follows is full of new information but reveals little of more than local significance, not through any fault of the author, but simply because there is little of this kind to be revealed. The generalities which it illustrates are of the most familiar kind: that those who live by trading services to third parties favour free trade; that those who live by producing for a small domestic market want protection; and that governments which depend fairly equally on the political support of both are inclined to attempt economic concessions to each in turn. William I's government appears to have been more successful than most in giving mild satisfaction to both sides. Consequently the one conclusion of value for

European history that is established by this book is the negative one that conflicts of economic interest and policy, which at the end of the Napoleonic Wars seemed likely to be acute, had in fact little influence on the eventual Belgian revolt against the union.

The study is supported by numerous tables of commercial statistics, some very useful, some perhaps a little misleading. In particular, the index numbers of trade between Britain and the Netherlands, since they are derived solely from the British official values of total imports and total exports, have little meaning. The proportion which different commodities (each with a different margin between its real and official values) contributed to the total varied a good deal from year to year. Consequently the index is one whose weights are altered each year to an extent that is both arbitrary and unknown.

W. ASHWORTH.

Changing Melanesia: *Social Economics of Culture Contact*. By CYRIL S. BELSHAW. Oxford University Press. London: Geoffrey Cumberlege. 1954. x + 197 pp. 17s. 6d.

In Search of Wealth: *A Study of the Emergence of Commercial Operations in the Melanesian Society of South-eastern Papua*. By CYRIL S. BELSHAW. American Anthropological Association, Vol. 57, No. 1, Part 2, Memoir No. 80. February, 1955. Obtainable from the Department of Anthropology, University of British Columbia, Vancouver 8, Canada. x + 84 pp., illus. $2.

Dr. Belshaw has served in the Colonial Administration in the Solomon Islands, and has performed military service and field research in the New Hebrides and New Caledonia. These territories are surveyed in *Changing Melanesia*, while *In Search of Wealth* shifts its focus north-westwards.

Given Dr. Belshaw's knowledge of administrative problems from within, it is noteworthy that the picture he paints of the development of these territories is a most unhappy one. These books, sober, even prosaic, as they are, ought to be read by all who have accepted the contemporary cant that the spread of European influence represents an advance in enlightenment. Melanesians have been ejected from land desired by Europeans, exploitation by private individuals and firms is well established, while the growth of petty trade is hampered by the Treasury policy of not issuing coins smaller than one shilling. If it be argued that European administration has ensured security, it needs to be remembered that the native peace had been most seriously disturbed by Europeans, and that the latter imposed their own order on populations decimated by their use of European firearms and by the introduction of European diseases. It was only to combat the latter, incidentally, that European hygiene became necessary—the native system of hygiene had worked well enough before.

It was hardly to be expected that such an administration would deliver the natives from the missionaries. Some of the islands in the group are, in effect, theocracies; and with European missionary activity have come European ideological conflicts—the converts of one mission show no great liking for those of another. Missionary methods were similar to those of the protagonists of new ideologies elsewhere. Native customs which were considered hindrances to missionary activity were attacked; and children were removed from their traditional environment during schooling. It is true, however, that those who now show the best adjustment to Western "materialism" are those best indoctrinated by the missions; an interesting, if unexplored, question is the extent to which trade follows the Bible, and the counter the altar.

All this is developing its inevitable whirlwind. Dr. Belshaw has no doubt that the various social movements in the area, some of which have achieved publicity as "Cargo Cults", are actually nationalist in character. The student of fairly recent Asian developments will be able to recognise many familiar trends in this account.

Some social anthropologists, with whom Dr. Belshaw seems to be in sympathy, hold that one of their tasks is to represent the native peoples to their alien rulers. From these books it is clear that representation is indeed necessary. Yet perhaps this is best achieved by changing the present set-up: "the content of the laws enforced by the State administrative machines is in none of these . . . colonies dependent on Melanesian approval before its enactment, and there is no machinery by which Melanesian disapproval can be made effective at the highest level". No orthopædist can know how the shoe fits so well as the layman who wears it.

Dr. Belshaw's most important theoretical contribution is his chapter on "Social Change in Theory" in the first study. Contemporary sociological theory is placing strong emphasis on the analysis of values as a tool of research; it is all the more surprising that rarely, if ever, is even passing recourse had to economic theory as the repository of such an analysis, albeit tested in the market. The author, originally trained as an economist, is an exception. He paraphrases the concept of "elasticity of demand" to mean "changes in the relationship between the quantity of the end achieved and the difficulty of achievement", and considers it "the fundamental feature illustrating changes in values".

As important on the administrative plane is his cogent argument that Western techniques must be adapted to indigenous institutions, not vice-versa; and in his second study he shows how indigenous forms of social organisation were put to the service of economic enterprise of a Western type.

He is not, however, always free from a common anthropological failing: to consider the local as peculiar. Thus he argues that Wagawaga, one of the Papuan communities studied, is in a transitional stage of development. One is inclined to ask whether all stages of development are not transitional; particularly when to support his analysis, he states that "man and wife are not in harmony, . . . and there is some trepidation about the ultimate consequences of the present path of advance". Not only, alas, in Wagawaga.

LESLIE H. PALMIER.

The Economic Development of Nigeria. INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT. Johns Hopkins Press, Baltimore. 1955. xii + 686 pp. $ 7.50.

The pattern of the reports produced by the International Bank Missions is now a familiar one. A team of about a dozen spends a few months in the country and subsequently produces a report which assembles together a vast amount of information on the economy and a detailed development plan for the next few years.

The Report on Nigeria follows this general pattern faithfully. The General Report (128 pages) discusses the economic background of the country, presents the suggested development plan and outlines the methods of organising it and financing it. The Technical Reports cover the next 480 pages. These are mainly concerned with fact-finding and detailed recommendations on the various productive sectors of the economy but also deal with more general points such as capital formation and the balance of payments. (One might, incidentally, ask why Education has stronger claims than Health to appear in this section.) Finally, there are some 60 pages of Appendices mainly of a statistical character.

Many of the facts in this volume have already been published in one form or another. But it is a great convenience to have them all together in one place and arranged so that the various interrelationships in the economy stand out. Many of the judgments are not new either. But again it is a great advantage to have them reaffirmed by an independent authority of unquestioned integrity and standing.

One may perhaps question the utility of a detailed plan of development for an economy which is changing so rapidly. As with modern armaments, the plan is bound to be obsolete by the time anyone takes notice of it. However, not much harm may be done so long as it is emphasised that the chief merit of such exercises is the negative one of showing what *cannot* be done in the near future.

Of course, there are suggestions which will not meet with everyone's approval. The compromise on the Marketing Boards is an example. One wonders about the feasibility of the plans for a State Bank in the complete absence of any short-term money market. One might also regard the discussion of pioneer industry tax relief as a little superficial, e.g. the open-ended commitment implied in tax holidays for new enterprises is accepted uncritically. But on the whole the general attitude is sensible. In particular, the pitfalls of applying " Western " concepts *en bloc* are avoided.

Anyone who thinks that the basic requirement for development of such countries is more knowledge about them, and particularly co-ordinated knowledge, must accord a great welcome to this Report.

A. R. PREST.

The Cotton Mills of India, 1854–1954. By S. D. MEHTA. Textile Association (India), Bombay. 1954. ix + 308 pp.

This book was sponsored by the Textile Association of India as a part of the programme for the Centenary Celebrations of 1954. There is little literature on the industrial development of India, and this work is therefore of some importance, dealing as it does with one of the earliest and most successful of India's industries, and utilising sources in the Indian language for the first time in a venture of this kind and magnitude.

As a pioneering venture, and as a record of the facts of development, the book is a most valuable contribution. From other points of view it is less satisfactory. No doubt, it is salutary for British readers to have the history of British cotton tariff policy (and, indeed, the history of British economic policy in India generally) presented for consideration from an Indian point of view. The more is the pity that the case should be presented with so little balance and such obvious partiality. There may be tenable arguments, for example, for British Government policy after 1867 having been unduly affected by the influence of Lancashire manufacturers and by an attitude to free trade that ignored the difference in the economic circumstances of Britain and India—though there is much to be said on the other side. But the superficial nature of Dr. Mehta's commentary on the topic, and his patent desire to demonstrate the wickedness and stupidity of all British policy and the inevitable right-mindedness of Indian attitudes, robs his argument of conviction. A comment on the silver question typifies Dr. Mehta's attitude: the British argument that the development of the Indian mill industry was being artificially stimulated by the fall in the price of silver in the last quarter of the nineteenth century is dismissed as " manifestly incorrect ", though it is agreed that the fact that China (the important and growing Indian export market) and India were both on a silver standard, and Britain was not, " might have given a negative advantage to India " (p. 48).

Nevertheless, as a record of the springs of entrepreneurial activity in India, as a study of the problems of creating an industrial labour cadre, and more generally as a contribution to the study of the economic history of India during a most interesting period, the book has much to commend it. It is to be hoped that Dr. Mehta's plea for assistance in the preservation of the historical (industrial) records that might make other such studies possible will not be ignored.

J. WISEMAN.

SHORTER NOTICES

War Economy 1939–1942. By S. J. BUTLIN. Angus & Robertson. 1955. 504 pp. 25s.

Written by the professor of economics in the University of Sydney, this is the first of two volumes in the civil section of the official series " Australia in the War of 1939–1945 ". It covers the period from the Imperial Conference of 1937, to the end of 1941, when on Christmas Day Hong Kong fell and Australia was physically threatened for the first time in its history. Enlivening his narrative with a number of particularly apt political cartoons from the daily and weekly press, the author, who was director of the Economic and Statistical Division of the Department of War Organisation of Industry during these years of the war, covers the topics of price control, the export industries, external finance and shipping, the problems of man-power, transport and fuel, and the search for a financial policy. This period of integration was a crucial one in the country's economic development, and the achievements were considerable. Price control, for example, which covered all commodities, limited price rises more effectively than in any other belligerent. The intricate and fascinating story is told well and with authority.

From Mine to Market: the History of Coal Transportation on the Norfolk and Western Railway. By JOSEPH T. LAMBIE. New York University Press. (Vol. III in the Business History Series.) 1954. xviii + 380 pp.

The production, distribution and use of coal symbolise much of the achievement and most of the problems of American economic life during the half century or more which followed the Civil War. This book tells the story of the coal traffic of one railroad (blessed with the un-American name of railway when the company was reorganised in 1896) from the time of the first exploitation of the West Virginia coalfield in the early 1880s. This coalfield in 1951 produced almost one-third of all bituminous coal mined in the U.S.A. The author combines painstaking historical research with the analytical tools of the economist. Owing to the presentation by topics, however, the reader sometimes has difficulty in following the chronology of events—a minor defect in an otherwise admirable and useful study.

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Some Notes on the Estimation of Time-Forms of Reactions in Interdependent Dynamic Systems[1]

By A. W. Phillips

I

The Need for Quantitative Knowledge of Economic Reactions

In dealing with questions of economic policy it is necessary to form some judgement about the magnitudes and time-forms of the responses of individuals or groups of individuals to changes in certain of the conditions confronting them. We may take as an example the problems facing a Government which is pursuing a policy of keeping employment at the highest level consistent with the maintenance of free convertibility, at a fixed rate of exchange, between its own currency and that of another major country, it being the policy of the other country to keep its own employment at the highest level consistent with the maintenance of stable product prices.

Let us assume that some change, say an increase in the desire of home firms to invest in new capital equipment, leads to an increase in production and in the demand for factors of production, and that as a result factor prices begin to rise more rapidly than the secular rise in productivity, so that product prices rise. Because of the higher home demand and rising costs and prices, imports will gradually rise and exports decline, the consequent deficit in the balance of payments being met by drawing upon reserves of foreign currency. The Government will take action to correct the adverse balance of payments by reducing home demand, either through a reduction in its own expenditure or, more likely, by increasing taxes, or reducing the quantity of money and raising interest rates, in order to induce private individuals and firms to reduce their expenditure. The degree to which a given policy measure will correct the adverse balance, and the speed with which it will do so, will depend on the magnitudes and the speeds of a long chain of reactions, or rather a complex network of interdependent reactions or responses. Examples of these are the response of investment demand to changes in the availability and price of credit and to changes in income, the response of production and income to changes in demand, the response of consumption to changes in income, the responses of prices of products and of factors of production to changes in the demand for them, the responses of consumption and investment demand to changes in the rate of change of prices, and the responses of imports and exports to changes in income and prices, both at home and abroad.

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[1] I am indebted to J. Durbin, F. G. Foster, M. G. Kendall, A. Stuart and R. H. Tizard for helpful discussion on some of the points dealt with in this paper.

The extent to which it will be necessary to depress economic activity and employment during the correction process will depend on the magnitudes and speeds of these responses, on the size of the foreign reserves at the disposal of the Government, and on the magnitude of the initial disturbance. Alternatively, if the reduction in economic activity and employment is to be kept within some limit which is considered tolerable, the size of the reserves that will be needed will depend on the magnitudes and speeds of the responses and on the magnitude of the initial disturbance. It is clear that some quantitative knowledge about the responses in the system is necessary both for rational discussion of the relative merits of alternative policies and for the satisfactory implementation of whatever policy is adopted.

There is another reason, less obvious but no less important, for wishing to obtain quantitative knowledge about the different responses. It can be shown that any interdependent dynamic system may have an inherent tendency to fluctuate when subjected to disturbances. Whether it will fluctuate, and the severity with which it will do so, will depend on the quantitative values of all the relationships in the system, including the policy relationships. Moreover, these dynamic properties of the system depend not only on the magnitudes and speeds of the responses, but also on their time-forms. A change in the time-form of a response, even with no change in the total time required for the response to be completed, may very significantly affect the stability of the system.[1]

There are, therefore, two questions to be asked when judging how effective a certain policy would be in attaining any given equilibrium objectives. First, what dynamic properties and cyclical tendencies will the system as a whole possess when the policy relationships under consideration themselves form part of the system ? Second, when the system has these dynamic properties, will the equilibrium objectives be attained, given the size of the probable disturbances and the permissible limits to movements in employment, foreign reserves, etc. The answer to the first question is important, not only because the reduction of cyclical tendencies is itself a desirable objective, but also because the second question cannot be answered without knowing the answer to the first. And the first question cannot be answered without knowing the magnitudes and time-forms of the main relationships forming the system.

II

THEORETICAL SPECIFICATION OF AN INTERDEPENDENT SYSTEM

In this paper we shall be concerned with estimating the time-forms of structural or behaviour relationships. We shall consider a particular economic example, the dependence of aggregate consumption on the aggregate disposable income of consumers.

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[1] For an example of this, see my forthcoming article, " Stabilisation Policy and the Time-Forms of Lagged Responses ".

Theoretical considerations lead us to the hypothesis that the total quantity of consumers goods purchased per unit of time by all the consumers in a country depends on the total real incomes at their disposal per unit time and on a number of other factors, such as the value of their assets and the rate of change of the average level on product prices. If income changes, the other factors affecting consumption remaining constant, consumers will adjust their purchases of consumers goods. Each consumer affected by the change will take some time to adjust his expenditure, and the speed of adjustment will be different for different consumers. The adjustment in aggregate consumption resulting from a single change in aggregate disposable income will therefore be distributed through time. This is illustrated in Fig. I. The step in the curve Y at time $t = o$ represents a unit change in disposable income from a level to which consumption has become fully adjusted. We should expect the time-path of the resulting adjustment of consumption to be somewhat like that shown by curve C, consumption rising slowly for a while, then more rapidly, then more slowly again until at a certain time, say $t = l$, it has again become fully adjusted to the level of income. We shall call the time-path followed by C during this adjustment the direct response of C to a unit step in Y.

In order to obtain a general expression for the relationship between consumption, C, and disposable income, Y, when Y is free to vary continuously, we note that the hypothesis that consumers react to a single change in Y at time $t = o$ by changing their purchases of consumers goods at different points of time in the interval between $t = o$ and $t = l$ implies that the value of C at any time t depends on the values taken by Y at earlier points of time in the interval between t and $t - l$. We shall assume that the relationship is linear. Then if the magnitude of the dependence of C at the point of time t on Y at the point of time $t - \tau$ is denoted by $f(\tau)$, the hypothesis can be written in the form of an integral equation

$$(1) \qquad C(t) = \int_o^l f(\tau)\, Y(t - \tau) d\tau + \kappa + \epsilon(t),$$

in which κ is a constant and $\epsilon(t)$, which we assume to have zero mean and constant variance, denotes all variations in consumption except those resulting from the direct reaction of consumption to changes in income. Following Koyck,[1] we shall call $f(\tau)$ the time-shape, or time-form, of the reaction of C to Y, or the reaction function. Equation (1), and in general any equation expressing a hypothesis, derived from theoretical consideration of the behaviour units constituting the system, will be called a reaction equation.

If $f(\tau)$ is known, the time-path of the adjustment of C resulting from any specified changes in Y, assuming $\epsilon(t)$ remains constant, can be found from (1). It will be useful to derive the direct response of C to a unit step change in Y, since this response is closely related to the reaction function $f(\tau)$ which it is desired to estimate. If Y remains constant, say at value Y', from a time before $-l$ until time o, C will reach a constant value, say C', before time o. Suppose now that the value of Y

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[1] L. M. Koyck, *Distributed Lags and Investment Analysis;* Amsterdam: North Holland Publishing Co., 1954; p. 9.

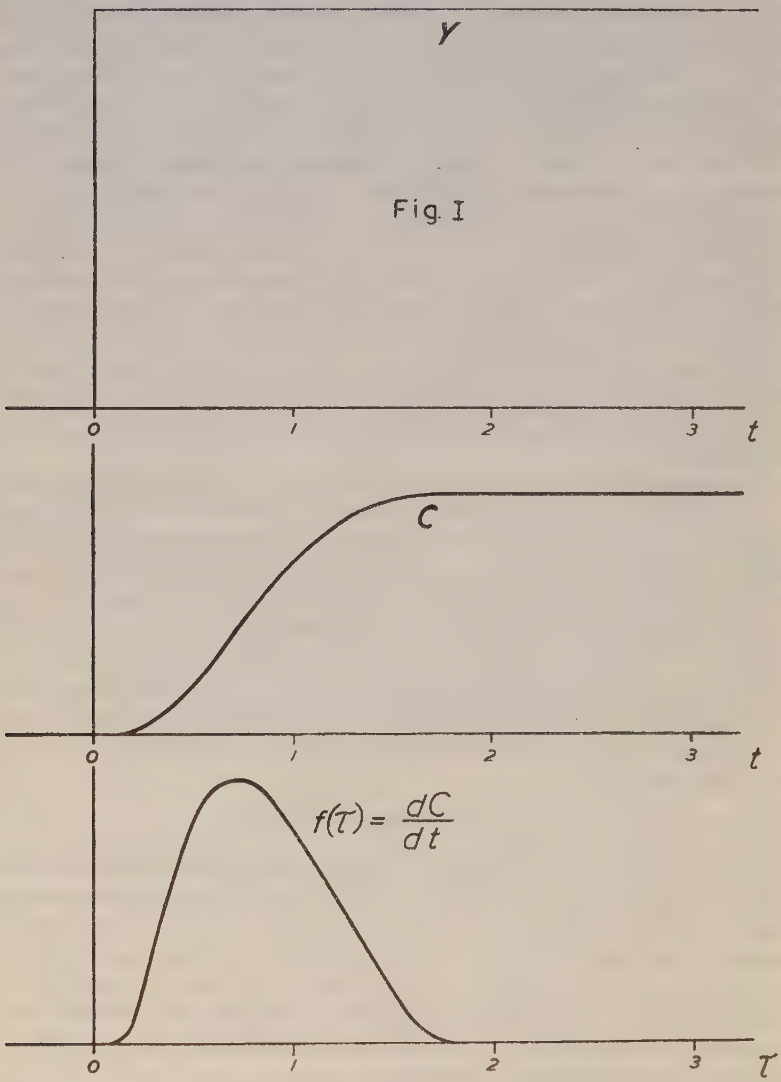


Fig. I

increases to $Y' + 1$ at time o and remains constant at that value until time l. From the principle of superposition in linear systems, the value of C at any time between o and l is obtained by adding to the value it would have had if Y had not changed (i.e. C') the effect of the unit increase in Y operating over the interval from o to t. That is, the direct response of C to a unit step in Y at $t = o$ is given by

$$(2) \qquad C(t) = \int_o^t f(\tau)d\tau + C', \qquad (o \leq t \leq l),$$

the integral term in (2) being obtained from that in (1) by setting $Y(t-\tau)$ equal to unity for $o \leq \tau \leq t$.

Differentiating (2) with respect to time, we obtain

$$(3) \qquad \frac{dC}{dt} = f(t), \qquad (o \leq t \leq l).$$

Thus setting τ equal to t, the reaction function $f(\tau)$ is given by the direct response of C to unit step in Y at $t = o$. In Fig. I, if curve C is the response of C to unit step in Y, the curve $f(\tau) = \frac{dC}{dt}$ is the reaction function. The dependence of consumption on any other factor affecting it can be analysed in a similar way. As we are assuming that the system is linear, the effects of changes in the different factors will be additive and can be allowed for explicitly by putting additional integral terms in (1).

The hypothesis that consumption decisions will be affected by changes in income gives the relationship between C and Y stated in (1). There will also be other relationships between C and Y resulting from other classes of decisions. For example, firms producing consumption goods will alter their output in response to changes in the quantity purchased from them per unit time, causing changes in the disposable income derived from the production of consumption goods. This reaction can be written as

$$(4) \qquad X(t) = \int_o^m \phi(h)\, C(t-h)\, dh + \lambda + \xi(t),$$

where $X(t)$ is disposable income derived from the production of consumption goods, $\phi(h)$ is the magnitude of the dependence of X at time t on C at time $t-h$, or the time-form of the reaction of X to C, m is the interval over which the dependence exists, λ is a constant and $\xi(t)$ denotes all variations in X except those resulting from the reaction of X to C.

We should expect the time-form of the response of X to a unit step change in C, assuming that $\xi(t)$ remains constant, to be somewhat like that shown by curve X in Fig. II. The increased purchases of consumption goods would be met for some time by drawing on stocks held by retailers, wholesalers and producers, causing little or no rise in disposable income. After a time producers would increase output, some more rapidly than others, causing a gradual rise in incomes derived from the production of consumption goods. The desire to replenish stocks, depleted as a result of the lag in the response of production, would lead to a rise in production above the level required to meet the new level of consumption, but as stocks were gradually built up production would fall back again to its new equilibrium level. The corresponding reaction function, showing the time-form of the dependence of X on past values of C, is given by the curve $\phi(h) = \frac{dX}{dt}$. The negative values of the reaction function over part of its range are characteristic of relationships in which stock and flow adjustments are combined.

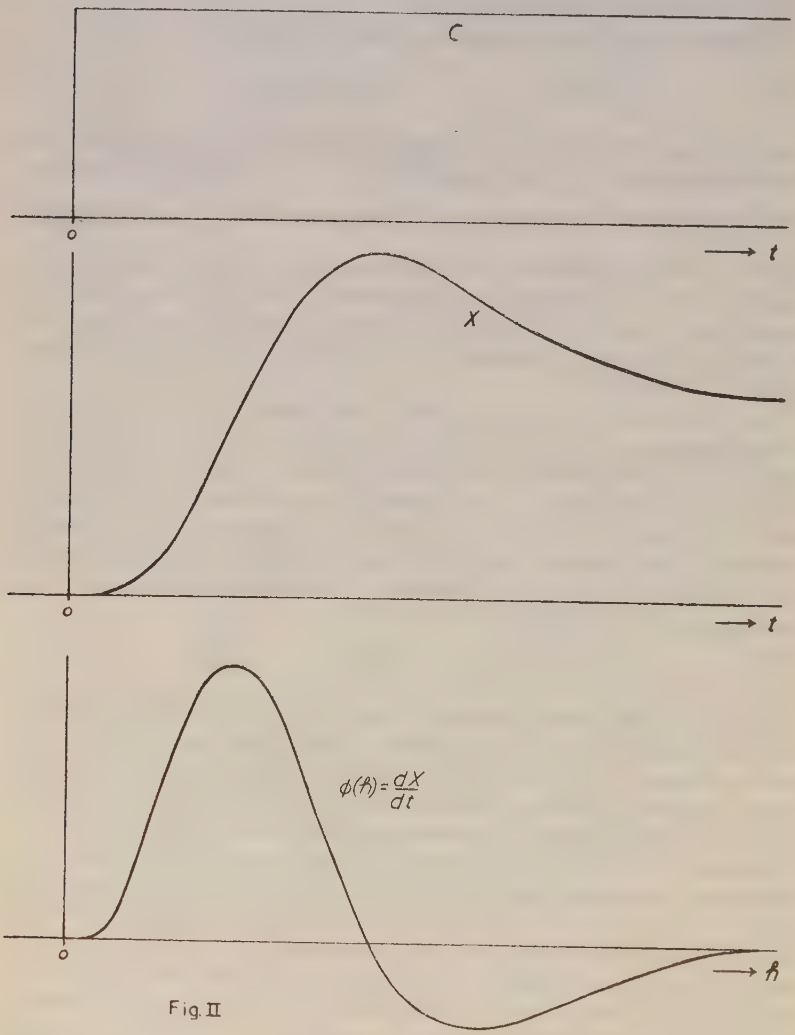


Fig. II

If now we denote disposable income derived from all sources other than the production of consumption goods by $\zeta(t)$, so that

$Y(t) = X(t) + \zeta(t)$, we obtain from (4) a second relationship between Y and C;

$$Y(t) = \int_{o}^{m} \phi(h)C(t-h)dh + \lambda + \xi(t) + \zeta(t). \tag{5}$$

(1) and (5) are a pair of simultaneous integral equations forming an interdependent system.

III

RELATIONSHIPS BETWEEN DISCRETE SERIES DERIVED FROM A CONTINUOUS PROCESS

The variables C, Y and ϵ in (1) are functions of continuous time, and we can think of them as flows per unit time. Our observations, however, are of the quantities resulting from cumulating the flows over discrete periods of time. If the length of the period is Δt, and if we number the period between $t = o$ and $t = \Delta t$ period o, that between $t = \Delta t$ and $t = 2\Delta t$ period 1, and so on, then the observed value of C in period n, which we shall denote by C_n, is given by $C_n = \int_{n\Delta t}^{(n+1)\Delta t} C(t)\,dt$ and the observed value of Y in period n is $Y_n = \int_{n\Delta t}^{(n+1)\Delta t} Y(t)\,dt$. Similarly we may define ϵ_n (which will not be observable) as the time integral, over the nth period, of $\epsilon(t)$.

Because of the discrete nature of the empirical data, and also because statistical methods for analysing discrete series are more fully developed than those for analysing continuous processes, it has been customary in empirical work in economics to estimate relationships between the discrete observed series, and to use these estimates to make inferences about the relationships existing in the real continuous process. In order to investigate the validity of such inferences, let us suppose that one relationship in a real process is exactly described by (1), and to avoid estimation problems let us eliminate the stochastic element by supposing that $\epsilon(t)$ remains constant, say at ϵ'. There is then a unique functional relationship between the continuous variables C and Y. There is not, however, any unique relationship between the observed series of C and Y, since the observed value of C for any period n depends not only on the observed values of Y for the periods n, $n-1$, etc., but also on the values taken by Y within the periods. Only if Y has a definite intra-period time form, the same for all periods, will there be a determinate relationship between the observed series.

To take a simple case, let us assume that $Y(t)$ changes only at the final instant of each period, so that $Y(t) = \frac{Y_n}{\Delta t}$ for $n\Delta t \leq t < (n+1)\Delta t$. Since (1) is linear, the effects on C of the values taken by Y in each period are additive and so can be considered separately. Now the value of Y during period n can be analysed into the sum of two step functions, a step from o to $\frac{Y_n}{\Delta t}$ at time $n\,\Delta t$ and a step from $\frac{Y_n}{\Delta t}$ to o at time $(n+1)\,\Delta t$. If curve (a) in Fig. III, which has the same form as curve C in Fig. I, is the direct response of C to unit step in Y at time $n\,\Delta t$, and curve (b), obtained by shifting (a) one time period along the time axis, is the direct response to unit step in Y at $(n+1)\;\Delta t$, then the direct response of C to a step $\frac{Y_n}{\Delta t}$ at time $n\,\Delta t$ followed by a step $-\frac{Y_n}{\Delta t}$ at time $(n+1)\,\Delta t$ is equal to the vertical distance between the (a) and (b) curves multiplied by $\frac{Y_n}{\Delta t}$. The amount of consumption during each of the periods n, $n+1$, and $n+2$ resulting from the income of period n is therefore the area between the (a) and (b) curves over each of these periods (equal to the rectangles A_0, A_1 and A_2) multiplied by $\frac{Y_n}{\Delta t}$.

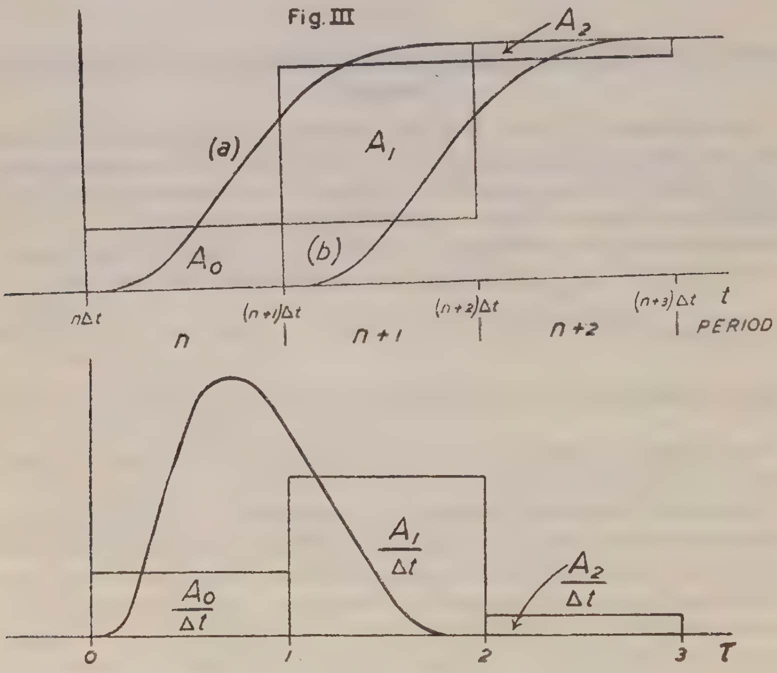


Fig. III

By similar reasoning, the consumption of period n resulting from the income of period $n-1$ is $\frac{Y_{n-1}}{\Delta\,t}\cdot A_1$ and the consumption of period n

resulting from the income of period $n-2$ is $\frac{Y_{n-2}}{\triangle t}\cdot A_2$. The total consumption in period n is the sum of that resulting from the income of each of the periods n, $n-1$, and $n-2$, together with an amount $(\kappa + \epsilon')\triangle t$ resulting from the constant terms in (1). The relationship between the discrete series for C and Y is therefore

$$C_n = \frac{A_0}{\triangle t} Y_n + \frac{A_1}{\triangle t} Y_{n-1} + \frac{A_2}{\triangle t} Y_{n-2} + (\kappa + \epsilon')\triangle t. \tag{6}$$

In Fig. 3 the period has been chosen equal to the unit of continuous time, so $\triangle t = 1$. In the lower part of the figure the coefficients of the Y's are drawn as a histogram on the same axes as the reaction function $f(\tau)$. It will be seen that the histogram is a very poor approximation to the reaction function.

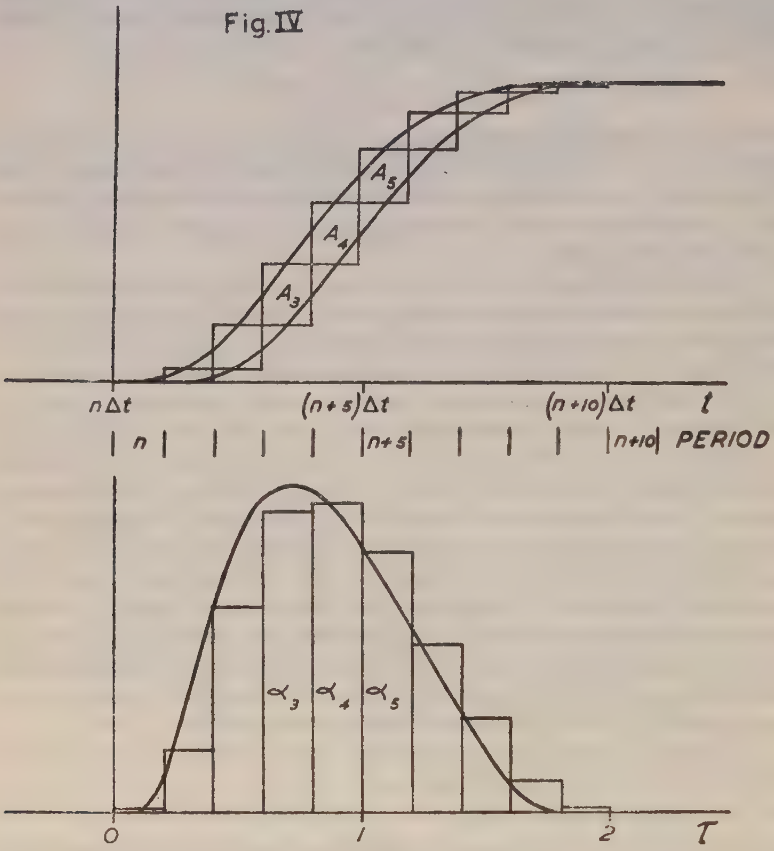
From the construction of Fig. 3 it can be seen that the number of periods over which the discrete variables are related is always one more than the number of periods within which the continuous response is completed. It follows that the discrete variables must be related over at least two periods unless the reaction in the continuous system is instantaneous. This is obviously true, since if the reaction is not instantaneous the values taken by C in the early part of any period depend on the values taken by Y in the later part of the preceding period. Very often in econometric work the estimated magnitude of the relationship between two discrete variables in the same period has been interpreted as a measure of the relationship between the continuous variables. This procedure, which in the example we have been considering amounts to taking the estimated height of the rectangle A_0 as a measure of the height of the response curve (*a*), is clearly invalid unless the reaction is so rapid, relatively to the length of the observation period, that it can be considered almost instantaneous.

To allow for variations in the length of the period, we can write in place of (6) the more general equation

$$C_n = \alpha_0 Y_n + \alpha_1 Y_{n-1} + \ldots + \alpha_r Y_{n-r} + (\kappa + \epsilon')\triangle t, \tag{7}$$

in which the α's can be found graphically as before and r is the integer which satisfies the condition $\frac{l}{\triangle t} \leq r < \frac{l}{\triangle t} + 1$, so that C_n depends upon Y_{n-r} but not upon Y_{n-r-1}, Y_{n-r-2}, etc. In Fig. IV, the length of the period has been reduced to one fifth of that used in Fig. III, and it will be seen that the histogram of the coefficients of the Y's is now a much better approximation to the reaction function. As the length of the observation period is reduced towards zero the relationship between the discrete variables tends to become independent of the intra-period time-form of the Y's and the histogram of the α's tends to the real reaction function $f(\tau)$.

Since we cannot in practice assume that the Y's will have any definite intra-period time-form, the α's in (7) will not be strictly determinate. In discussing estimation problems in the next section we shall assume that the observation period is sufficiently short for the α's to be fairly well determined, so that it will be possible to speak with some meaning, though not a precise one, about the consistency of estimates of their values.



IV

ESTIMATION PROBLEMS

When $\epsilon(t)$ is free to vary (7) becomes

$$C_n = \alpha_0 Y_n + \alpha_1 Y_{n-1} + \dots + \alpha_r Y_{n-r} + \kappa \Delta t + \epsilon_n. \tag{8}$$

Equation (5) gives rise to a second relationship between the discrete variables which can be expressed approximately, for small Δt, by the equation

$$Y_n = \beta_0 C_n + \beta_1 C_{n-1} + \dots + \beta_s C_{n-s} + \lambda \Delta t + \delta_n, \tag{9}$$

in which s is the integer which satisfies the condition

$$\frac{m}{\Delta t} \leq s < \frac{m}{\Delta t} + 1 \text{ and } \delta_n = \int_{n\Delta t}^{(n+1)\Delta t} (\xi + \zeta)\, dt.$$

We may consider the possibility of estimating the α's in (8) by fitting the estimating equation

$$(10) \qquad \hat{C}_n = a_0 Y_n + a_1 Y_{n-1} + \ldots + a_R Y_{n-R} + K$$

to the observed series by the method of least squares. We shall call C_n the observed value of the dependent variable, $\hat{C}_n$ the fitted value of the dependent variable, and $C_n - \hat{C}_n$ the residual. The variables on the right hand side of the estimating equation will be called the explanatory variables. All the factors to which C directly reacts in the real system will be called determining factors. Any determining factors not included among the explanatory variables will be called omitted factors. Variations in C caused by changes in the omitted factors will be called a disturbance. From standard regression theory, the values of the a's in (10) obtained by minimising the sum of the squares of the residuals will be consistent estimates of the α's in (8) (i.e. the values of the a's will tend to those of the α's as the size of the sample approaches infinity) provided the disturbance is not correlated with any of the explanatory variables.

If there is to be no correlation between the disturbance and the explanatory variables, the following conditions must be satisfied, except in special cases which are trivial:

Condition 1. R in (10) must be equal to or greater than r in (8). For if $R < r$, the determining variables $Y_{n-(R+1)}, Y_{n-(R+2)}, \ldots, Y_{n-r}$ have been omitted from the estimating equation and the disturbance is

$$\alpha_{R+1} Y_{n-(R+1)} + \alpha_{R+2} Y_{n-(R+2)} + \ldots + \alpha_r Y_{n-r} + \epsilon_n.$$

By substituting (8) in (9) we see that the Y's are generated from the δ's and ϵ's by an auto-regressive process and must therefore be autocorrelated, so the disturbance will in general be correlated with the explanatory variables $Y_n, Y_{n-1}, \ldots, Y_{n-R}$.

Condition 2. β_0 in (9) must be zero.[1] For if β_0 is not zero Y_n will depend on C_n and, from (8), C_n depends on ϵ_n, so that Y_n will depend on ϵ_n and so will be correlated with it. Now β_0 will be zero if the reaction of X to C is zero during an interval equal to one observation period, i.e. if the reaction function $\phi(h)$ in (4) and (5), shown graphically in Fig. II, is zero for $0 \leq h < \Delta t$. It has been argued above that there will be some interval during which the reaction of X to a change in C will be zero or negligible, so with sufficiently short observation periods β_0 may be zero, and if the period is further reduced β_1, β_2, etc., may also become zero.

Condition 3. The disturbance must not be autocorrelated over intervals equal to or greater than the number of periods during which the reaction of X to a change in C is zero.[1] To prove this, suppose that conditions (1) and (2) are satisfied, so that the disturbance is ϵ_n and $\beta_0 = 0$, and solve (8) and (9) for Y_n. It will be found that the general solution can be written

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[1] In Wold's terminology, the system is then recursive. Cf. H. Wold and L. Juréen, *Demand Analysis* ; New York : John Wiley & Sons, Inc. 1953 ; p. 14.

$$(11)\ Y_n = (B_1\epsilon_{n-1} + B_2\epsilon_{n-2} + \ldots) + (\delta_n + L_1\,\delta_{n-1} + L_2\,\delta_{n-2} + \ldots) + M,$$

where M is a function of the α's, β's, κ, λ and Δt, and so is a constant for given Δt, the expressions in the brackets are infinite series, and the B's and the L's are functions of the α's and β's. It can be shown that if $\beta_i = 0$ for all i from 1 to k, where k is any integer, then $B_i = 0$ for all i from 1 to k; and if $\beta_i \neq 0$ for $i = k + 1$, then $B_i \neq 0$ for $i \geq k+1$. Multiplying (11) by ϵ_n and summing over all observations, we obtain

$$(12)\ \Sigma\epsilon_n Y_n = (B_1\Sigma\epsilon_n\epsilon_{n-1} + B_2\Sigma\epsilon_n\epsilon_{n-2} + \ldots) + (\Sigma\epsilon_n\delta_n + L_1\Sigma\epsilon_n\,\delta_{n-1} + L_2\Sigma\epsilon_n\,\delta_{n-2} + \ldots) + M\Sigma\epsilon_n.$$

There will be no correlation between ϵ_n and Y_n if, and only if, $\Sigma\epsilon_n Y_n = 0$. If $\beta_i = 0$ for all i from 1 to k, and if $\beta_i \neq 0$ for $i = k + 1, k + 2, \ldots, s$, then all the terms inside the first pair of brackets will be zero if, and only if, $\Sigma\epsilon_n\epsilon_{n-j} = 0$ for all $j > k$.

Condition 4. The ϵ's must be uncorrelated with δ's of the same and earlier periods. For if this is not so the terms inside the second pair of brackets in (12) will not all be zero.

If these four conditions were all satisfied ϵ_n would be uncorrelated with Y_n in an infinite sample since all the terms inside both pairs of brackets would vanish, and the last term also vanishes, since ϵ has zero mean. And by obtaining from (11) the equations for Y_{n-1}, Y_{n-2}, etc., multiplying through by ϵ_n and summing over all observations it is easily seen that under these conditions ϵ_n would also be uncorrelated with the other explanatory variables $Y_{n-1}, Y_{n-2}, \ldots, Y_{n-R}$.

However, conditions 3 and 4 cannot in fact be satisfied, since equations (8) and (9) represent only part of a much wider interdependent system, in which there are additional relationships involving reactions of C to changes in the explanatory variables, reactions of both C and the explanatory variables to changes in " exogenous " factors, i.e. to factors which are themselves independent of the system, and reactions of the explanatory variables to changes in C.

As an example of the first class of reactions, which we shall call forward reactions since the causation runs from the explanatory variables to the dependent variable, we may suppose that changes in income give rise to changes in the value of assets owned by consumers, and that consumers react to changes in the value of their assets by changing their consumption expenditure. Then the variation in consumption resulting from these reactions is included in ϵ and so ϵ is dependent on the values taken by Y and δ in the same or earlier periods. In order to prevent correlation between the disturbance and the explanatory variables resulting from these and other sets of forward reactions it is necessary to include among the explanatory variables each factor to which C directly reacts and which itself reacts, directly or indirectly, to changes in any other explanatory variable, unless the variations in C caused by that factor can be estimated by methods independent of the time-series data and eliminated from the observed series for C. And from the discussion of condition (1) above it is clear that for each factor included among the explanatory variables sufficient lagged values must be inserted to allow for all the periods over which the dependence of C on that factor exists in the real system.

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[1] J. Wise has shown that in a recursive system in which there is zero reaction of the explanatory variable to a change in the dependent variable for only one period, autocorrelation in the disturbance causes correlation between the disturbance and the explanatory variables. See his forthcoming article, " Regression Analysis of Relationships between Autocorrelated Time-Series ".

If those factors to which C directly reacts, and which themselves react, directly or indirectly, to changes in Y, are omitted from the estimating equation, and if the conditions outlined in the next two paragraphs are satisfied, then we may obtain an estimate of the total reaction of C to Y, resulting from the combined effects of all the forward reactions. An estimate of the time-form of a total reaction may be useful for some purposes.

We may take seasonal influences, affecting both the explanatory and the dependent variables, as an example of the second class of reactions, which we shall call parallel reactions to exogenous factors. Again it is possible, in principle, to prevent correlation between the disturbance and the explanatory variables resulting from parallel reactions to exogenous factors, either by estimating separately the direct reaction of C to the relevant exogenous factors and eliminating the estimated variation from the observed series, or by including the relevant exogenous factors among the explanatory variables.

The third class of reactions will be called feed-back reactions. As an example, we might expect changes in the sales of consumption goods to lead to changes in firms' investment in capital goods, and so to changes in incomes derived from the production of capital goods. By a similar argument to that used in discussing conditions 2 and 3 above it can be shown that these feed-back reactions will cause correlation between the disturbance and the explanatory variables unless the observation period is sufficiently short to prevent any feed-back within an observation period, through any of these reactions, from the dependent variable to any of the explanatory variables, and unless the disturbance is non-autocorrelated over all intervals equal to and greater than the number of periods during which there is zero feed-back through any of these reactions. Therefore even if C is the only variable in the system which reacts directly to a particular exogenous factor, if the variations in C resulting directly from changes in that factor are autocorrelated over intervals longer than the interval during which there is zero feed-back from C to any explanatory variable, either the variation caused by that factor must be estimated separately and eliminated from the observed series for C, or else that factor must be included among the explanatory variables, if correlation between the disturbance and the explanatory variables is to be avoided.

V

BRIEF SURVEY OF PRACTICAL POSSIBILITIES

The conditions outlined above for obtaining consistent estimates of the time-forms of reactions in interdependent systems are very stringent and it is clear that they cannot be completely satisfied in any economic investigation. It may, however, be worth while looking at the magnitude of the problem that would be involved if we were prepared to accept rough approximations to the real relationships.

The number of factors which directly influence any economic variable is usually large, but it might be possible to account for most of the variation in certain variables by including four or five determining factors in the estimating equation. To reduce to reasonable proportions the errors arising from feed-back and from the use of discrete relationships it might be sufficient in some cases to have observations in quarterly periods, in other cases monthly or even weekly data might be required. We should expect responses in aggregative economic relationships to extend over a couple of years or more, so that at least ten or a dozen lagged values of each factor would be needed in the estimating equation, giving at least fifty explanatory variables. Difficult problems would arise in the elimination or fitting of seasonal variations and in dealing with trends. There would also be problems of multi-collinearity, since we can expect to find a high degree of correlation between explanatory variables. The computational work involved in fitting fifty or perhaps a hundred coefficients of an estimating equation would be very great, though it might be managed by using electronic digital computors. It might be possible to reduce the work, and also perhaps to obtain more efficient estimates, by fitting a few general time-forms of reactions instead of numerous coefficients, though there would be some statistical difficulties in doing this.[1]

One major difficulty is that both the dependent and the explanatory variables may be influenced by factors which give rise to large movements, but which cannot be treated quantitatively, though they may be quite comprehensible, and readily interpreted historically. To use qualitative judgement to allow as far as possible for such movements leaves the door wide open to the introduction of subjective bias, but failure to allow for them makes it certain that statistical inference will be invalid. The former course seems preferable.

It seems possible that an electronic analogue machine, or simulator, might be a useful device for making rapid approximate trials to see whether any clear relationships at all can be derived from given data, and if so for trying a number of alternative hypotheses in order to judge, in the light of relevant economic and historical considerations, which ones give the most convincing explanation of the phenomena being investigated. An electronic simulator consists of a number of units such as adding units, delay units, multipliers, integrators, differentiators, etc., which can be connected together in different ways to simulate responses of a wide variety of time-forms by variations in electrical voltages. The time required for a complete response can be varied, but it is usual to make it a fraction of a second and to repeat it several times a second so that it can be made to appear as a steady picture on an oscillascope. The simulator operates with continuous time and it would be necessary to convert the observed series into continuous electrical voltages.

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[1] Cf. Koyck, *op. cit.*, pp. 32–39.

In using the simulator the series for say four or five explanatory factors would be represented by continuous voltages. The voltages would be applied to the inputs of separate response-simulators, and the outputs from them would be added electronically to give the " fitted " values of the dependent variable, which would be shown on an oscillascope together with the observed values. The voltage representing the " fitted " values would be subtracted from that representing the observed values to give the " residual " as a continuous voltage. This voltage would be squared and then integrated over time, and the integral would be shown on another oscillascope. The time-forms of the reaction functions set on the separate response-simulators would be adjusted by a trial and error process to obtain the minimum integral of the square of the residual.

One advantage of an electronic simulator is that it can be used to simulate certain types of non-linear relationships.

The London School of Economics.

A Study in Price Policy[1]

By I. F. Pearce

It is an axiom of economic theory that the price at which goods change hands in any market is that which will equate supply and demand. In other words, prices are fixed at " what the market will bear " and not according to cost. As a result of empirical investigations undertaken at Oxford and elsewhere this axiom has, of recent years, come to be challenged. It is sometimes alleged that, in the case of manufacturing industry, prices are fixed according to cost plus some given percentage profit (peculiar to the trade), irrespective of the state of demand. If this were true the consequences for economic theory would be far-reaching and a good deal of re-thinking would be necessary. It is however agreed on all sides that before embarking upon such re-thinking empirical studies are urgently required to confirm or refute the new hypothesis. The present paper, it is hoped, provides a particle of the evidence needed.

All evidence requires interpretation and no doubt the conclusions drawn from the facts observed in the present case are in some degree coloured by the personal prejudices and beliefs of the present writer, which derive from his own experience in industry and his early training as a cost accountant. It may be as well therefore to explain at once what these beliefs are. I share with Professor R. S. Edwards surprise " that the description of procedures well known and long practised in industry should apparently be regarded in some quarters as a significant discovery ".[2] There can be no doubt that it is an almost universal custom to use as a basis for price fixing a figure, derived, more or less accurately, from past accounting data and/or future estimates, which would be described by an economist as a long-period average cost. It is equally indisputable that in many cases there exists within the firm a recognised profit margin (usually expressed as a percentage on average cost) which remains stable over periods long enough to be significant and which is generally accepted to be normal. What is perhaps less generally known, except to those who practise the art of price fixing, is how often and for what a variety of reasons " normal " profit is not in fact charged against any particular order. Professor Edwards points out that " between the preparation of the cost estimate and the actual determination of price (informal) discussion usually takes place about the assumptions underlying the cost figures and about the market situation ". If the market situation is tight, cost estimates will be looked at more closely and possibly cut, or less than normal profit will be accepted. In a sellers' market a more than normal profit margin may be charged to feel out the state of demand. This informal adjustment of margins, since it is both informal and *ad hoc*, tends to be left out of any general discussion of price fixing routine and yet the issue really turns upon it. How flexible are profit margins and what in fact determines " normal " profit ? It is my belief that margins charged are highly sensitive to the market situation under normally competitive conditions and that the " norm " is simply that figure around which they fluctuate. Only where there is monopoly or near monopoly does the margin tend to harden into an inflexible figure, which may be determined in part by historical accident and in part by fear of legislation or other interference, if profit became too high.

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[1] The factual information here presented was obtained largely as a by-product of an enquiry undertaken by the Department of Industrial Economics, University of Nottingham, and financed by the Board of Trade out of conditional aid funds. My thanks are due to Mr. S. R. Maxwell and Mr. Lloyd Amey who assisted in the analysis of the company's records.

[2] Professor R. S. Edwards: " The Pricing of Manufactured Products ", *Economica*, August 1952.

What follows is concerned with the behaviour over time of one firm only. It is considered worth while however to make the findings known for at least two reasons. In the first place the accounting evidence presented is of a kind not often made available for publication and this material provides very good evidence of the existence of the informal adjustment of margins referred to above. Secondly the whole experience carries with it interesting methodological implications. These arise out of the fact that the impressions gained in conversations seemed in some respects to contradict the evidence obtained from the accounts. This fact takes on an added significance when it is remembered that most, if not all, of the investigations which have led to the suggestion that full-cost pricing might be the rule, have relied entirely upon the method of the questionnaire. It is hoped that the present study may go some little way towards explaining why, with the best will on both sides, the questionnaire method can be misleading.[1] This point is returned to later.

The firm concerned is medium-sized, employing four to five hundred workers, and operates under approximately competitive conditions. Only a small percentage of the output is for stock. In the main every order is separately bespoken and, except in the case of repeats, an individual price must be fixed for each. In every case a cost estimate is prepared (based on previous experience and current knowledge of raw material prices) at the same time as the order is negotiated. The procedure for this is as follows. A technical estimate is made of material requirements and probable preparation and running time for the order. The material is priced and direct labour can be charged at appropriate rates.[2] All other costs are treated as overheads and are applied as a rate per " chargeable " hour, the number of chargeable hours for the order being the estimated preparatory and running time referred to above. The overhead rate is obtained by summing the actual expenditure for the previous financial year on overhead items and dividing by the total number of hours in which machines were either running or being prepared for running in that year. The cost estimate therefore carries with it the assumption that the level of production, as measured by chargeable hours, will remain the same in the current year as it was in the previous year. This fact should be borne in mind as it is of some importance in interpreting the trading account summaries given below. A profit margin is added to estimated cost to give " selling price ".

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[1] See also on this point F. Machlup, *A.E.R.*, June 1939, p. 234.

[2] In practice direct wages are included with overheads in a single hourly charge when the estimate is made up.

It is worth noting that the method of allocating overheads here described makes it impossible to interpret the estimated selling price simply as a fixed percentage mark-up of prime cost. If overheads were crudely charged as a percentage on prime cost (as is the practice in some trades) then selling price could be thought of in this way. In the present case, however, there is clearly an attempt to calculate long-period average costs including the fixed element and to charge profit as a percentage upon this. This point is emphasised since the accounts presented later do show, in at least one line, some degree of stability in the ratio of overheads plus profits to prime costs. It will be argued later that this arises by accident rather than by design.

It is interesting also to reflect that the average cost calculated in this way implies essentially a long-period rather than a short-period view. The conditions of production are assumed always to be normal. The implication is that, if an order is not accepted, then an appropriate share of fixed expenses can be escaped. The impression is gained by the present writer that the business man has in his mind the idea that, in the absence of definite knowledge to the contrary, his competitors' long-period normal costs will be roughly the same as his own, and that where market price is unknown the long-period cost (plus normal profit) will be the best guess. The calculation of short-period marginal cost would obviously not provide any such guide. And in the case of a manufacturer producing to order, no market price as such exists, only some idea of the usual profit that can be made from any given line. For this reason alone it is imperative that an estimate of long-period average cost should be made.

One further point arises in connection with these estimates. Material to be used is always charged at *replacement* price and not at the price at which it may have been purchased for stock. This is of some importance since it has been held[1] that, as a general rule, the contrary is true, and that the practice of charging for materials at cost will lead to the fixing of selling prices too low during a boom and too high in a slump. This, it is alleged, tends to increase the range of economic fluctuations. The present writer's strongly held view, that the standard practice in estimating would be to charge at replacement price, is at any rate not contradicted by the sample of one under review.

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[1] K. Lacey : *Profit Measurement and Price Changes*, pp. 26/27.

So far only the routine estimating procedure has been outlined. This routine might appear, at first sight, to lend support to the idea that cost is the determining factor in price fixing; but in fact the customer is not always charged the selling price calculated by the estimating department. Furthermore there is evidence of an objective kind that, in the minds of the price fixers, estimated selling price and actual price charged are *not* normally regarded as synonymous. On the printed form used for the recording of all these data a separate space is provided for each of total selling price, quoted selling price, and actual price charged. And on investigation wide variations in these were found to be quite usual. In what follows the expression " estimated selling price " is used to identify the estimated cost plus the " normal " profit addition. This should be distinguished from selling price which is the figure actually paid by the customer.

Two samples of estimates were drawn at random for examination ; the first from orders completed in the financial year 1949/50 and the second from the year 1953/54. In so far as it was possible to identify them from the information available, repeat orders were dropped from these samples owing to special complications involved in costing connected with the nature of the product.[1] Fifty-seven orders proved suitable for analysis in sample one and forty-five in sample two. A simple calculation made it possible to determine the " normal " profit added to the cost estimate for each order. Surprisingly enough, in view of the impression gained in conversation, this profit margin did not seem to be at all fixed even in any given financial year; nor was it possible from the data available to discover any obvious principle according to which the figure was set in each case. No correlation was evident, for example, between the value of the order and the profit margin. Figs. 1 and 2 are histograms showing the frequency of the various deviations of estimated selling price from cost.

Remarks made by the officers of the company suggested that some idea of what ought to be normal profit did exist. A figure of one-twelfth of cost was in fact mentioned and this is confirmed, for the year of the enquiry (1954), by inspection of Fig. 2, where the mean of the distribution is seen to be in the region of 8%. How frequently 8% profit is *not* charged however is evident from the spread of both Fig. 1 and Fig. 2. The extent of this spread is of course evidence of the existence of something like the informal adjustment of the margin to meet individual cases referred to at the beginning of this paper. It is doubtful however how far the officers of the company would accept this statement in precisely these terms. Specific questions about specific items revealed a number of considerations which are normally taken into account in fixing margins. There is an awareness that different orders of the same nominal value require different times for completion and hence earn profit at different rates over time. This

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[1] It is regretted that it is not possible to give details of the nature of the product in case the firm concerned might be identified thereby.

Fig 1 1949-50

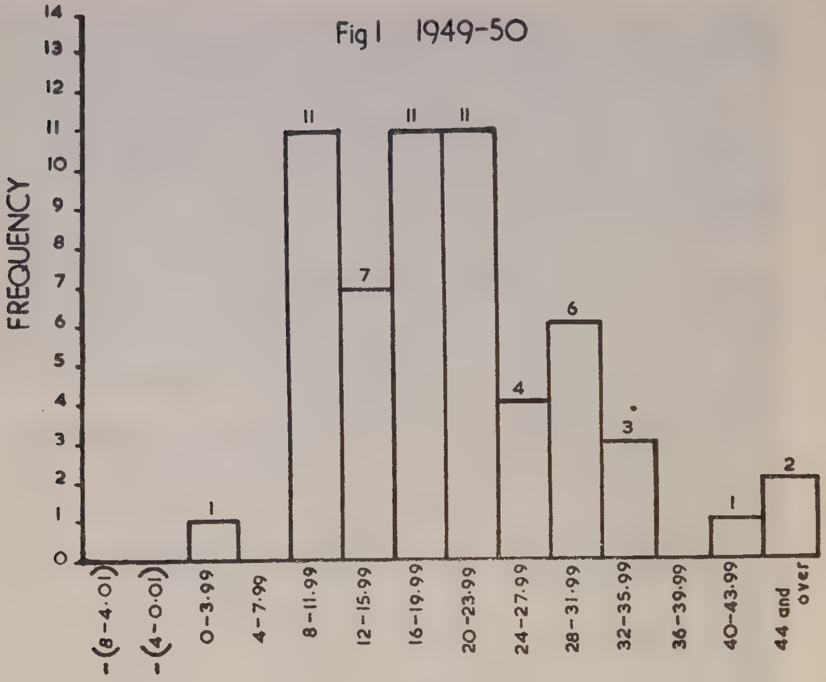
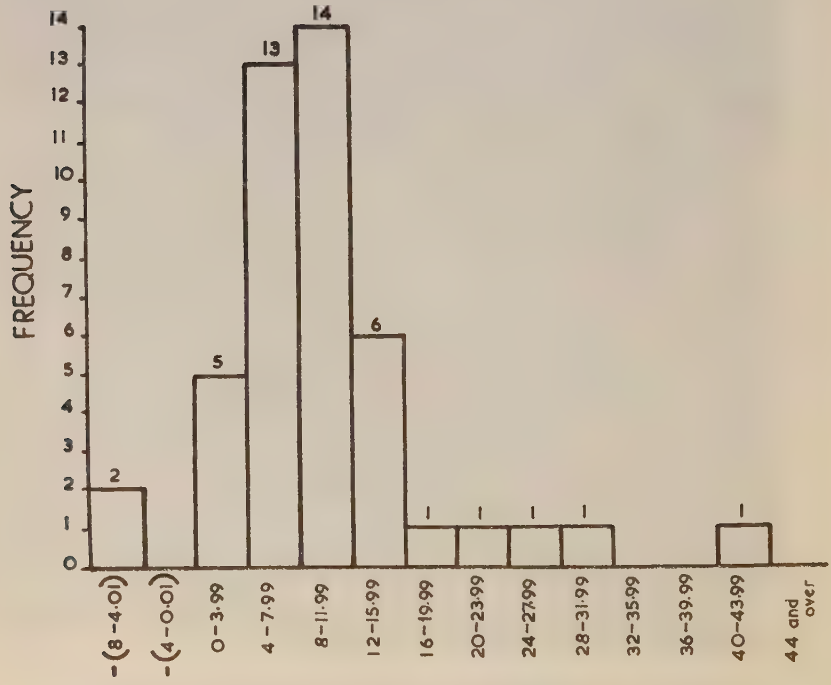


Fig 2 1953-54



PERCENTAGE DEVIATION OF ESTIMATED SELLING PRICE FROM ESTIMATED COST arises out of the fact that the material and labour contents of different classes of work vary considerably. Orders with a low material content should properly carry a higher rate of profit than those with a high material content. Other reasons for divergences were given which implied straightforward consideration of what the market would bear. Goodwill, knowledge of competitors' prices or what the customer would pay were mentioned. It was also said that attention had to be paid to questions of balance. Orders which would clearly give rise to a disproportionate amount of work in any one process, and which might thereby create bottlenecks or areas of slackness, are made to carry a higher rate of profit.

In addition Figs. 1 and 2 reveal a change over time in the average profit margin, that of 1949/50 being almost twice the 1953/54 figure. This is in part due to a reorganisation of the accounting system which took place in 1952 and a consequent redefinition of what is meant by cost[1] ; but there is independent evidence also in the same period of the deliberate application of a keener price fixing policy designed to increase sales and so to ensure the full absorption of overhead costs.

Finally we note that quite apart from the variations in the profit margin added to obtain estimated selling price there are sometimes further variations between estimated selling price and actual selling price. Where this variation is large it may be due to special circumstances but there does seem to have been, particularly in the 1949/50 sample, some scope allowed for a final bargaining with the customer before final acceptance of an order. Skill of the estimators in guessing what the market will bear is reflected by the fact that orders for a very similar product often carry widely different margins for different customers. All the evidence from the examination of costs and estimates implies, what was earlier contended, that margins are very sensitive to conditions of the market both over time and between customers.

We turn now to the trading accounts of the company. These are prepared by the firm in five sections, four corresponding to each of four main selling lines, A, B, C and D, the fifth being a summary and final account. From each of the accounts A to D it is possible to derive a statement showing the actual cost of materials, direct wages, overhead and net factory profit for each of the twenty-three years 1930-1952. Overhead includes factory overheads but excludes some office expenses, interest charges, depreciation and tax. The actual net profit therefore is considerably lower than is suggested by the figures below. Table A refers to the main product which represents the greater part (very approx. two-thirds) of the firm's output by value. We concentrate most of our attention therefore on this.

It will be noted that in the 30's the ratio of material to labour content (Table A) remained surprisingly stable despite the wide variation between

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[1] Certain overhead items excluded from cost prior to 1952 were included after that date. This in itself justified a reduction in the margin.

PRODUCT A—FACTORY COSTS AND PROFIT EXPRESSED AS A PERCENTAGE OF SALES

YEAR	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Direct Materials	31·7	30·0	30·7	30·2	31·4	*	31·0	32·5	33·5	34·4	34·7	41·1	40·2	14·3	15·2	18·2	19·3	30·0	31·7	32·0	29·4	34·2	34·8
Direct Wages	28·9	29·4	31·7	32·1	31·9	*	30·8	29·2	29·4	27·3	28·2	22·0	17·8	33·9	39·3	34·4	33·7	31·0	29·7	29·7	29·7	26·6	27·8
Overheads	20·8	19·2	21·3	22·0	20·9	*	20·6	18·7	18·2	16·1	19·0	15·0	9·3	20·3	21·6	17·1	18·7	14·1	15·8	17·4	15·7	14·2	15·1
Net Factory Profit	18·5	21·4	16·2	15·7	15·8	*	17·5	19·6	18·9	22·1	18·0	21·9	32·6	31·4	23·9	30·3	28·3	24·9	22·7	20·9	25·2	24·9	22·3

* Not available

PRODUCT B—FACTORY COSTS AND PROFIT EXPRESSED AS A PERCENTAGE OF SALES

YEAR	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Direct Materials	20·8	20·4	17·5	20·8	24·4	*	20·2	20·6	22·3	21·4	23·4	23·6	32·5	20·7	20·8	18·5	19·8	26·4	25·2	28·7	28·5	31·0	37·7
Direct Wages	10·4	10·1	10·5	11·3	10·7	*	12·1	12·6	12·6	13·6	14·9	13·6	15·7	12·2	11·6	10·2	15·1	14·9	14·3	16·0	19·0	17·6	14·4
Overheads	37·1	34·5	37·2	42·1	43·1	*	43·5	40·9	44·1	45·3	44·8	50·0	48·2	45·1	37·3	43·0	39·1	30·1	29·9	33·8	31·0	30·6	32·8
Net Factory Profit	31·7	34·9	34·7	25·7	21·9	*	24·2	25·9	21·0	19·7	16·8	12·7	3·6	22·0	30·3	28·3	26·0	28·6	30·6	21·5	21·5	20·8	15·1

* Not available

PRODUCTS C AND D

YEAR	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
PRODUCT C																							
Direct Wages and Materials	74·4	71·6	70·3	70·6	71·6	*	73·1	71·0	72·3	72·8	71·0	65·0	69·0	73·0	77·6	63·9	64·3	63·8	66·0	62·7	59·8	60·3	69·5
Overheads	25·9	22·3	23·9	24·1	25·8	*	23·9	22·0	25·0	24·2	23·1	24·8	23·3	21·1	19·2	19·7	17·4	18·8	16·0	19·7	17·7	18·2	18·5
Net Factory Profit	–·4	6·1	5·9	5·4	2·7	*	3·0	7·0	2·7	3·1	5·9	10·2	7·8	5·8	3·2	16·4	18·2	17·4	18·0	17·7	22·5	21·5	12·0
PRODUCT D																							
Direct Materials	INCLUDED IN								53·3	43·8	45·5	53·3	50·0	72·8	19·6	33·5	60·9	53·9	41·6	58·2	52·0	52·4	60·1
Direct Wages	TABLE C UP TO 1937								32·6	23·5	18·5	21·3	18·4	25·7	22·7	15·1	27·3	15·2	16·6	22·1	22·2	19·6	25·5
Overheads									44·4	34·2	19·6	21·2	21·8	30·3	24·0	27·2	20·8	18·9	19·2	21·2	17·4	14·4	25·6
Net Factory Profit									–30·3	–1·6	16·4	4·2	9·8	–28·9	33·7	24·1	–9·0	12·0	22·5	–1·5	8·4	13·6	–11·1

* Not available

individual orders already commented upon. This stability is even more marked when allowance is made for changes in the price of raw material which occurred over the period. In fact the ratio of inputs, labour/material, adjusted as far as possible for relative price changes[1], becomes :

1930	1931	1932	1933	1934	1935	1936	1937	1938
·67	·62	·65	·67	·66	not available	·65	·61	·71

This would seem to suggest that in the 30's at any rate the mix of orders remained fairly constant and that this factor can be ignored in assessing the significance of changes in the average margin of profit. During the war there was a considerable change in the class of work undertaken as is evidenced by the figures, and the post-war position is complicated by serious fluctuations in the price of raw material relative to wage rates. The post-war return to the pre-war pattern on the non-price adjusted figures (table A) is more apparent than real.

Now if prices were consistently charged on a cost plus basis and if at the same time output remained reasonably stable so that there was no serious under-recovery or over-recovery of overheads it would be expected that the ratio of profit to cost plus profit would be very stable over the years. In fact it is not. Leaving out the war period 1940-46 when conditions were in any case unusual, profits range from 15·7% to 25·2%. There is a remarkable difference between the pre- and post-war averages. For the period 1930-38 average profits were 18% whilst for the years 1946-52 the figure was 24%. This could possibly be accounted for by the post-war sellers' market.

Much more significant are the year-by-year fluctuations. Consider the period 1930 to 1938 when, as already noted, the mix of orders was probably very consistent. Compare the movement of the Board of Trade Index of Wholesale Prices (which may be taken as a rough index of market conditions) with the profit percentages earned.

	1930	1931	1932	1933	1934	1935	1936	1937	1938
B.O.T. Index (1938 = 100)	98·65	86·6	84·5	84·5	86·9	87·7	93	107·2	100
% Profit	18·5	21·4[2]	16·2	15·7	15·8	n.a.	17·5	19·6	18·9

The tendency for the profit margin to be cut in a slump and to be increased during a boom seems quite apparent even here.

One point arises however. It was explained above that in allocating overheads the rate per chargeable hour is calculated on the previous year's performance. Now if output is abnormally low in any year then the overhead recovery rate in the following year will tend to be set high. Hence estimated cost will be higher and, if prices are fixed on the cost plus system, so will selling price. Thus if as a result of a general improvement of demand, output increases in any given year then overheads will tend to be over-recovered. This would mean that the ratio of profit to cost would be higher in the given year than in the previous year despite the rigid application of the full-cost rule of pricing. It may be thought therefore that this alone could account for the apparent tendency to cut the margins during the slump and raise them in the boom. Some measure of output is desirable as a check upon this. Unfortunately the figures for total chargeable hours which are the most significant in this connection are not readily available, except for the years 1932, 1934 and 1936. These were 85,408, 82,271 and 85,179, respectively, indicating no significant change in output. (A 3% change in output would of course lead only to something less than a 1% change in the profit margin on the cost plus system.) If the fall in profit margin from 21·4% in 1931 to 16·2% in 1932 had been due to a fall in output and the consequent failure to allow properly for overheads then we should expect an improvement in the profit margin in 1933 unless there had occurred a further sharp fall in chargeable hours in 1933. No such improvement in the profit margin is evident. And if a fall in chargeable hours had occurred in 1933 then it follows that there must have been a recovery in 1934 which would have led to an increase in the profit margin in 1934. This again is not evident.

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[1] To obtain the price-adjusted figures appropriate indices were derived from the internal records of the firm.

[2] This figure may appear surprising, particularly as 1931 is usually regarded very much as a slump year. Further investigation suggests that what happened in fact was that factor prices fell more rapidly than the price of the finished product.

A further rough check on this point is possible. With a non homogeneous product it is not easy to define what is meant by output, or to say (for small changes) whether it has increased or decreased. In the present case, however, there is some justification for saying that the number of chargeable hours varies approximately with the quantity of material input. An index of such input is compared below with an index of sales by value.

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Raw material input at 1930 price	100	104	93	85	87	-	85	89	79
Value of sales	100	95	81	74	74	-	73	79	75

It will be noted that the raw material measure of output does not violently contradict the chargeable hours measure for the years 1932, 1934 and 1936, which further suggests that this approach is justified. Accepting it, we see that there was a fall of 11% in output in 1932, which is sufficient to account only for a fall of 2% in the profit margin. But the profit margin in 1932 is over 5% lower than in 1931. Nor is there anything in the figures above to account for the failure to put prices up after 1932. Strict adherence to the full-cost rule would have led to an increase in prices in 1933 and a further increase in 1934. All the evidence suggests that some of the fall in the value of sales was due to deliberate cutting of profit margins in the face of decreases in demand.

It is worth emphasising also in connection with table A that the fluctuations in the profit margins are considerably damped by the fact that ten to fifteen per cent. of " sales " are not in fact offered direct to the market but are transfers on a cost basis to another department. They reappear as materials in table B below. The true fluctuations are somewhat greater than is suggested by the figures.

Also in connection with table A it should be noted that the fluctuations in the profit margin are offset to some extent by contrary movements in the overhead percentage. It is of particular importance to consider the reason for this since it has a bearing on the full-cost theory of pricing as sometimes expounded. The contrary fluctuations referred to impart a degree of stability to the ratio of overheads plus profit to price which may seem to lend support to the view that prices are determined by adding a fixed percentage to *prime* cost.

There are two reasons why such a conclusion should not be drawn from these figures. The first is that it is known as a matter of fact that prices are not fixed in this way and here the reader is referred again to the section above (p. 116, para. 2). The second is that there is a simple and natural reason for the contrary fluctuations, quite unconnected with price fixing policy. Overhead charges contain many items of a fixed nature whose prices do not vary as readily as those of raw materials or the final product. When prices are falling, overheads will form a higher percentage of selling price, since they tend to be fixed in money terms. But this is the very time when profit margins are being cut. The reverse will apply when prices rise generally. Hence in general the overhead percentage will vary in the opposite direction to the profit margin, giving rise to the stability of their sum.[1]

Table B summarises the product B trading account for the period. Here there is no marked difference between the pre- and post-war margins, but it is known that there has been some change in the nature of the product. For this reason and for technical reasons connected with the accounts the pre- and post-war comparisons are somewhat suspect. The considerable fluctuations in the margin evident in the period 1930-1938 are significant and interesting however. These are more marked even than in table A.

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[1] It is important to remember also that, if prices of overhead items had fallen proportionately, the fact that the hourly rate applied to recover overheads is based on the previous year's prices means that cost estimates would have been put too high. Whatever profit margin was in fact applied to the cost estimate the actual margin earned would be greater owing to over-recovery of overheads. Hence the actual earned profit margins of table A will tend to understate the cuts in the margins applied to estimates to the extent that the prices of overhead items might have fallen.

Prices of B goods have, in fact, to be negotiated eighteen months to two years in advance, i.e. at the time the order is placed. A greater risk therefore is involved in periods of fluctuating raw material prices. For this reason, and for the additional reason that sales are seasonal and hence capital tends to be tied up in stocks and work in progress, the profit margin on B goods tends to be somewhat greater than that on A. The difference in the two margins is not arbitrarily determined but is simply that which is brought about by the ordinary forces of competition.

In Tables C and D the profit margin fluctuations are even more in evidence. It should be pointed out however that the value of sales in these two sections represents only a very small proportion of the total sales of the company, and that, again for technical accounting reasons, the degree of accuracy of the figures is not all that might have been hoped for. On the other hand it certainly cannot be said that there is any evidence here of the operation of a strict cost plus system.

The third line of enquiry pursued was that of directly questioning those responsible. What is especially interesting from the methodological point of view is the fact that all the officers of the company approached were in the first instance[1] unanimous in saying that prices were fixed according to cost. The investigator who confined himself simply to the straightforward questioning method would almost certainly have concluded that the full-cost principle of pricing was the rule in this company. The difficulty seems to be one of framing suitable questions. If the business man is asked " How are prices determined ? " he will at once think of a state which the economist would describe as long-period competitive equilibrium and reply "According to cost plus a fair return ". This is of course precisely what Adam Smith would have said. If the question is put more specifically as " How do *you* fix *your* prices ?" he will explain the routine whereby he calculates his estimated selling price in the sense in which this term is used above. It seems likely that this kind of answer is given partly because, taking one order with another, estimated selling price and cost tend on the average to bear some relation and because the question seems to call for some kind of " by and large " answer. But it is also because it is not at all an easy thing to say why any particular price is charged for any particular order. As previously noted almost every divergence of price charged from the estimate had its own special explanation. Charging what the market will bear (although not necessarily anything of the kind), sounds a little too much like exploitation of the consumer to commend itself as a generalisation to the business man. On the other hand there is a willingness to admit that, where possible, " windfall " profits will be taken to offset the " windfall " losses which sometimes occur.

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[1] Some comments made by a senior officer of the company after reading a first draft of this paper are given in a Postscript.

The reader may wish to form his own conclusions however from the following report of conversations held, especially in the light of evidence from the accounts already presented. The approach adopted by the present writer was conversational rather than formal, but in essence rested upon three main questions which reflect his preconceived ideas as set out in the foregoing paragraphs. First there was the straightforward question " How do you fix your prices ? " If this elicited the usual answer it was followed up with a hypothetical case which postulated an out-of-equilibrium situation, e.g. " Suppose due to some new invention you became a low-cost firm able to undercut everyone—two years' worth of orders you cannot possibly complete are on your books. Would you then turn down further orders or edge up your prices ? " The third question was concerned to get views as to why the mark-up percentage used for estimating selling price is what it is. This question was not pursued if any reluctance to answer was sensed.

Mr. X said at once that although price fixing was not within his province he believed that prices were fixed on a cost plus basis. In the out-of-equilibrium situation described above he believed prices would be put up. This first contention was amended on reflection to the more moderate view that the estimated selling price served only as a guide to which were the most worth-while orders to seek and also as an estimate of market price in the absence of other information. The mark-up percentage was what over the years it was found could be normally earned.

Mr. Y was quite emphatic that the full-cost principle was the rule and quoted a current case where a price had been fixed for an order on the basis of an estimate which was subsequently found to contain an arithmetic error. Although the tender had been accepted by the customer and the order firmly placed, the error was explained to the customer and the price reduced. It was admitted on questioning however that considerations of goodwill were probably involved in some degree in this behaviour. The hypothetical case he regarded as very hypothetical and unlikely. He conceded however that in these circumstances most probably prices would be put up.

Mr. A said that cost plus was the principle but was quite ready to allow that this rule could be departed from in particular cases, if, for example, it were suspected that the customer would pay without question a higher price. A case of this was instanced where the customer, a large monopoly, was supplied with a marginal quantity of a line, the bulk of which was produced by a subsidiary. In another case the price was raised since it was felt that the work would involve some unbalance in the flow of production and accordingly there was no special wish to keep the order. Questions two and three were not pursued. The impression was gained however that Mr. A regarded the selling price estimate as a guide to the price fixer rather than a firm figure always to be adhered to.

Mr. W was most interesting. Nothing could shake him from the contention that cost plus was a rigorous rule allowing only of rare exceptions. He would not concede that the normal profit margin would be increased even in the hypothetical circumstances of question two. The percentage mark-up was the " customary " one. It was suggested to Mr. W that if this rule were in fact inflexibly applied the fact ought to be reflected in the accounts of the company. Surely the margin of profit as shown in the trading account should remain fairly stable over the years. He replied that the fluctuating margin was a feature of the accounts which he had previously noted and which had never ceased to puzzle him. He could offer no explanation.

The reader will, no doubt, wish to draw his own conclusions from the evidence here presented. The present writer cannot forbear however from expressing again his personal view that the nearest approach to a general rule of price fixing is simply " what the traffic will bear ." All that has been described above is common practice. The entity which the business man tries to maximise is the profit margin.[1]

The important exception to this rule arises in the monopoly case where the position is complicated by the fact that " what the market will bear " is dependent in an indeterminate way on output. It seems likely that here the cost plus rule is of greater importance.[2]

POSTSCRIPT

Naturally the reading of the first draft of the foregoing paper by the officers of the company concerned provoked further and most helpful discussion. Naturally also many apparent differences of opinion resolved themselves into difficulties in terminology. Some of these differences have been eliminated ; others, where not likely to be misleading, have been left in as illustrative of the very difficulties of communication which it is in part the object of the paper to describe. It seems appropriate and fair however to reprint verbatim the final summing up of a senior officer who was kind enough to spare the time to put some of his thoughts on the subject on paper. He writes:—

" Our idea is to have a careful estimate for every job we do. Deviation from the ideal may occur when the job changes so much between the time of the initial enquiry and that of final execution, that an estimate becomes meaningless and by agreement the job is ' charged on cost '. In this case the price policy is clear, cost plus. The question is, how is the size of the ' plus ' determined.

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[1] For an attempt to justify this on theoretical grounds see Gabor and Pearce, "A New Approach to the Theory of the Firm", *Oxford Economic Papers*, Vol. IV, No. 3, October 1952.

[2] It is hoped later to publish at least one more study on similar lines involving a monopoly product protected by a patent and covering a period before and after the lapse of the patent.

The following factors would be considered to determine if a rate higher than normal should be considered :—

1. The amount of skilled care and attention in the designing and preparation of the job—the amount of service rendered.

2. Any indication of price limit from customer.

3. Is the job such that however much its cost this would bear an insignificant relationship to the purpose, project or product for which it is required ?

4. The degree of dislocation at one or more stages of production which has been caused by the job.

All this may be reasonable enough, but is in any case secondary in importance to the question as to how normal profit is fixed. There is no doubt whatever that price is cost as estimated plus a margin. This margin can be either negative or positive. It can be negative only on a strictly limited number of occasions, but policy may dictate a negative margin in certain circumstances which are obvious and need not be described.

In the normal case the margin is positive. How is it determined ? I can only say how we attempt to determine it. We must first of all remember that in spite of post-war conditions our trade is still competitive. Competition may not, since 1945, have been cut-throat, but it has never been absent. We are first, foremost and all the time a ' quality house ' so that we are vulnerable on price.

Most customers will pay for quality up to a point, but there are very few for whom only the best will do, cost what it may. Even if we were the only house in the top quality field, and we are not, we should always have to meet competition. As it is, the ' good second-raters ' keep us on our toes and would soon kill any ideas of extravagant profit percentage, even if we had them. It might be that even at cost plus no profit, the market would tell us we were wrong, i.e. we should constantly lose orders, and we should act accordingly. We have set ourselves as a target to make a certain percentage on our net worth. This can be translated into a percentage of budgeted sales, and it is this percentage which is added to the estimated cost to yield ' normal ' profit."

Nottingham.

Tariffs, Balance of Payments, and the Terms of Trade[1]

By S. A. Ozga

I

The purpose of this article is to investigate the effect of tariffs on the balance of payments and on the terms of trade. The approach is one of general equilibrium, and the attack is along the lines of comparative statics. Starting from a certain equilibrium position we try to determine the course of its displacement in response to a change in tariffs. All the basic conditions of equilibrium such as tastes, techniques and the available productive resources are supposed to remain constant: tariffs are the only independent variable of the system.

The most common approach to the problem of tariffs is that not of general but of partial equilibrium. We argue that tariffs raise the home market prices of imports, that they reduce the volume of imports and depress the world market prices. They lead, therefore, to an improvement both in the balance of payments and in the terms of trade, the extent of the improvement in either of them being determined by the elasticities of demand and supply. We usually neglect the fact that the expansion in the production of the commodities protected by tariffs may require a diversion of some factors from the production of export goods, and that this may have an unfavourable effect on exports and on the balance of payments. Similarly, the reduction in the volume of imports means that less of those goods is being produced abroad and that the factors thus made unemployed may seek employment in the production of the goods which the country imposing the tariffs is exporting; this too may have an unfavourable effect on that country's exports and on its balance of payments. We neglect also the possibility that tariffs may stimulate investment in the industries producing goods competing with imports; this may lead to inflationary tendencies in the whole economy; some deflationary measures may therefore be required to keep the economy in balance; and these may result in a fall in the prices of exports, in a deterioration of the balance of payments, and in less favourable terms of trade.

The present article is an attempt to take into account all these secondary effects. The analysis is based on a long and rather laborious argument in mathematics. In order, however, to make the article readable also to those who have no patience to follow pages of mathematics line by line and are, therefore, prepared to take certain things for granted, the more involved parts of the analysis have been relegated to the Appendix; the main text gives only its general outline and the interpretation of the results.

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[1] I am indebted to Professor J. E. Meade for advice and helpful comments on the draft. I wish also to express my thanks to Miss J. Salkind of the L.S.E. Economic Research Division for checking my mathematics.

The results are not quite in line with those of the partial equilibrium approach. It turns out that we must not be so absolutely certain that if we allow for all the secondary effects, tariffs would really lead to an improvement in the balance of payments. Their ultimate effect may be to make the balance of payments worse. Even, however, if they do make it better, we must not expect them to have a favourable effect on the terms of trade. This may seem paradoxical at first sight; the conclusion, however, is that rather the opposite is the case. In what may be regarded as the typical situation tariffs imposed to improve the balance of payments tend to turn the terms of trade not in favour but against the country imposing them. Finally, the elasticities of the demand and supply may be quite irrelevant to the effect of tariffs on prices of imports and exports.

II

The analysis is based on the following set of assumptions:

1. There are two countries, I and II; country I is that which is making a change in its tariffs, country II may be interpreted as the rest of the world.
2. There are two commodities X and Y (or two groups of commodities, changes in the price ratios within either of them being neglected).
3. Perfect competition prevails in both countries.
4. There are no indirect taxes on home produced goods.
5. There are no transport costs.
6. Both countries are in " internal balance ".

The first five assumptions are familiar; they belong to the standard requisites of the theory of international trade. The last assumption requires some explanation.

Speaking in very general terms a country may be described as being in internal balance if there is no unemployment of productive resources and no inflationary or deflationary tendencies in incomes and prices. As the argument proceeds we shall have to face the difficult task of translating this condition into a formal constraint of a general equilibrium model. For the time being, however, we need not bother about this difficulty; let us proceed from the assumption that both countries are successful in maintaining full employment of their productive resources, and that this implies a certain monetary policy resulting in a certain *level* of prices. At this stage of the argument the reader is advised not to ask any questions about the nature of this policy and how it affects the level of prices. What we want to do in the first place is only to establish a very general relation between changes in tariffs, in the balance of payments, and in the world market prices of imports and exports, which would be applicable to any displacement of equilibrium, irrespective of how full employment is actually maintained and what are the changes in money prices.

There are, however, some questions which must be settled right at the beginning. The first is what shall we regard as money in a general equilibrium model. In this respect the present note follows the classical line of dichotomising the price system into a " real " sector and a monetary sector. In the conditions of equilibrium money is neither produced nor consumed; it is only a medium of exchange or a unit of accounting, and as long as equilibrium prevails there is no change in the quantity of money held by the community. The *relative* prices of the commodities produced and consumed are determined by the " real " conditions of equilibrium; price ratios must be always equal to marginal opportunity costs and to marginal rates of substitution in consumption. The *level* of money prices is determined by the monetary sector.

The present article differs from the classical line in that, although we may regard the initial conditions of the monetary sector as arbitrary, we believe that changes in them are not irrelevant to internal balance, and that, therefore, any movement of the economy from one position of equilibrium to another must be accompanied by such adjustment of its monetary sector and of the *level* of prices as are consistent with the condition of internal balance. The question as to what actually are these adjustments will be settled more or less by assumption. It will arise, however, only at a much later stage.

The second question which must be settled right at the beginning is whether and on what goods the Government is spending the revenue from tariffs. The answer is that, although the revenue from tariffs may affect the extent of the budget deficit or surplus, it does not affect total expenditure. The latter must be always sufficient to maintain full employment without any inflationary tendencies in costs and prices. The Government expenditure must, therefore, supplement the expenditure of the private consumers to such an extent as to satisfy this condition. In order, however, to avoid the complications which might result from the government expenditure being directed to different goods than that of the private consumers, we assume that there is no government spending on goods and services at all, but that total expenditure is maintained at the level of full employment by means of income allowances to the consumers. In other words, the actual buying of goods and services is being done by the consumers only, it is determined by the consumers' preferences, and it is sufficient to maintain full employment; but it is financed not only out of their incomes derived from production, but also out of the income allowances received from the Government. The sum of these allowances need not be equal to the revenue from tariffs; it must be only sufficient to maintain full employment.

The third question is what shall we regard as surplus or deficit of the balance of payments. As we are interested in how it may be affected by tariffs, the possibility of its disequilibrium must be allowed for in the conditions of the model. This means that the deficit or surplus on current account may not be equal to the autonomous transfer on capital account; in addition to an autonomous transfer there must be also an accommodating transfer which is not a determinant but is determined by the other items in the balance of payment. It may take the form of losses in reserves of foreign exchange, which tariffs are supposed to remove or reduce.

To simplify the model we will proceed from the assumption that there is no autonomous transfer at all, and that exports and imports are the only items in the balance on current account. This means that the accommodating transfer is equal to the balance of trade. Our problem reduces therefore to the following question: What is the effect of tariffs on the balance of trade if some mechanism is provided for any gap in it to be filled automatically by an accommodating transfer? The reason for tariffs to be imposed may be the fear that this mechanism may break down *in the near future*; tariffs are expected to prevent the reserves of foreign exchange being exhausted. We are, however, interested in the response of the balance of trade to a change in tariffs *before* the reserves have become exhausted, i.e., when the mechanism is still working.

III

We are using the following system of notation:

x', y', x'', y'' – represent the quantities of the commodities X and Y *produced* in Countries I and II, respectively.

X', Y', X'', Y'' – represent the quantities of the same commodities *consumed* in the same countries.

Let the commodity imported into Country I be "Y", and that imported into Country II be "X". They will be often referred to as import goods (Y in Country I, and X in Country II) and export goods (X in Country I, and Y in Country II) in spite of the fact that import goods in addition to being imported may be also produced at home.

p'_x, p'_y, p''_x, p''_y – are the *home market* prices of the two commodities in the two countries.

p_x, p_y – are the *export* (*world market*) prices of X and Y.

t', t'' – are the *ad valorem* rates of tariffs on imports in Countries I and II.

b – is the deficit of the balance of trade in Country I (or surplus in Country II) equal to the accommodating transfer, i.e., $b = (Y' - y')p_y - (X'' - x'')p_x$.

I' – is the value of imports in Country I, i.e., $I' = (Y' - y')p_y$.

R – is the proportion of the value of exports to that of imports in Country I (or imports to exports in Country II), i.e., $R = (X'' - x')p_x/(Y' - y')p_y$.

E', E'' – is the total expenditure in Countries I and II, respectively, i.e., $E' = X'.p'_x + Y'.p'_y$ and $E'' = X''.p''_x + Y''.p''_y$.

All prices and the values of exports and imports will be always expressed in the same currency, Country I's or Country II's.

Greek letters have been chosen to denote the following characteristics of the initial position of equilibrium.

ϵ', ϵ'' — are the elasticities of substitution of X for Y (or vice versa) *on the side of consumption*, i.e.,

$$\epsilon' = \frac{d\left(\frac{Y'}{X'}\right)}{d\left(\frac{p'_x}{p'_y}\right)} \cdot \frac{X'.p'_x}{Y'.p'_y} = \frac{d\left(\frac{X'}{Y'}\right)}{d\left(\frac{p'_y}{p'_x}\right)} \cdot \frac{Y'.p'_y}{X'.p'_x} \text{ and similarly for } \epsilon''$$

subject to the condition that the respective country's expenditure is so adjusted that the same quantities of both goods can be bought after a change in prices as were bought before it. For very small displacements of equilibrium this is equivalent to a movement along an indifference curve.[1] The elasticities of substitution on the side of consumption are always positive.

η', η'' — are the elasticities of substitution of X for Y (or vice versa) *on the side of production*, i.e.,

$$\eta' = \frac{d\left(\frac{y'}{x'}\right)}{d\left(\frac{p'_x}{p'_y}\right)} \cdot \frac{x'.p'_x}{y'.p'_y} = \frac{d\left(\frac{x'}{y'}\right)}{d\left(\frac{p'_y}{p'_x}\right)} \cdot \frac{y'.p'_y}{x'.p'_x} \text{ and similarly for } \eta''$$

subject to the condition that the changes in quantities and prices represent a displacement of equilibrium; that is to say that the respective economies remain on their production opportunity lines and price ratios are equal to opportunity costs. The elasticities of substitution on the side of production are always negative.

π', π'' — are the marginal propensities to consume import goods, i.e., commodities which in addition to being produced at home are also imported. Thus $\pi' = \partial(Y'.\,p'_y)/\partial E'$ and $\pi'' = \partial(X''.\,p''_x)/\partial E''$ subject to the condition that prices are constant. If neither of the two goods is inferior, both π' and π'' are positive and less than unity.

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[1] See J. R. Hicks and R. G. D. Allen: " A Reconsideration of the Theory of Value ", *Economica*, 1934, pp. 198/9 and J. L. Mosak, " On the Interpretation of the Fundamental Equation of Value Theory ", *Studies in Mathematical Economics and Econometrics*, Chicago, 1942.

Ω', Ω'' — are the proportions of the money values of production of import goods to the money values of the total production, i.e., $\Omega' = y'.p'_y/(y'.p'_y + x'.p'_x)$ and $\Omega'' = x''.p''_x/(x''.p''_x + y''.p''_y)$.

ϕ', ϕ'' — are the average propensities to consume import goods (the proportions of the money values of *consumption* of import goods to the money values of the total consumption), i.e., $\phi' = Y'.p'_y/(Y'.p'_y + X'.p'_x)$ and $\phi'' = X''.p''_x/(X''.p''_x + Y''.p''_y)$.

θ', θ'' — are the proportions of the volume of imports to the total consumption of import goods, i.e. $\theta' = (Y' - y')/Y'$ and $\theta'' = (X'' - x'')/X''$.

The last three proportions, i.e., Ω, ϕ and θ are always positive and less than unity.

IV

It has been already mentioned that the first step in our analysis is to establish a relation between changes in the balance of trade, in the two world market prices and in Country I's tariffs, which prevails in the neighbourhood of any position of equilibrium. The details of the mathematical argument are given in the Appendix; its general outline is as follows:

Consider the following conditions of equilibrium:

(*a*) The ratios of the home market prices of the two goods must be equal to their marginal opportunity costs, i.e.,

$$-\frac{dy'}{dx'} = \frac{p'_x}{p'_y} \text{ and } -\frac{dy''}{dx''} = \frac{p''_x}{p''_y}$$

(*b*) The ratios of the home market prices of the two goods must be equal to their marginal rates of substitution in consumption. This condition is implied in the definition of the elasticities of substitution ϵ' and ϵ''.

(*c*) The home market prices of the commodities exported must be equal to their world market prices, i.e., $p'_x = p_x$ and $p''_y = p_y$ (there are no export taxes and no subsidies).

(*d*) The home market prices of the commodities imported must be equal to their world market prices plus tariff, i.e., $p'_y = p_y.(1 + t')$ and $p''_x = p_x.(1 + t'')$.

(*e*) Total quantities produced must be equal to total quantities consumed, i.e., $X' + X'' = x' + x''$ and $Y' + Y'' = y' + y''$.

These five conditions are sufficient for the required relation between changes in the balance of trade, in tariffs and in the world market prices of exports and imports to be determined. As they must be satisfied in any position of equilibrium, the relation obtained is independent of any assumptions with respect to monetary sectors of the two economies; that is to say, it is independent of what changes in the *level* of prices are in the circumstances consistent with the condition of full employment.

The relation is

$$\left[\frac{db}{I'}\right]=\left[\frac{dp_y}{p_y}\right]-R.\left[\frac{dp_x}{p_x}\right]-\frac{A+R.B}{D}.\left\{\left[\frac{dp_y}{p_y}\right]-\left[\frac{dp_x}{p_x}\right]\right\}-\frac{A}{D}.\left[\frac{dt'}{(1+t')}\right] \text{(i)}$$

where $A = \left[\frac{(1-\phi').\ \epsilon'-(1-\theta')(1-\Omega').\eta'}{\theta'}\right].\left[1-\pi''.\frac{t''}{(1+t'')}\right]$

$$B = \left[\frac{(1-\phi'').\epsilon''-(1-\theta'')(1-\Omega'').\eta''}{\theta''}\right].\left[1-\pi'.\frac{t'}{(1+t')}\right]$$

$$D=(1-\pi').(1-\pi'')-\frac{\pi'.\pi''}{(1+t')(1+t'')}$$

The ratio R and the other terms in these expressions have been defined above.

Formula (i) represents a linear relation between the proportional changes $\left[\frac{db}{I'}\right]$, $\left[\frac{dp_y}{p_y}\right]$, $\left[\frac{dp_x}{p_x}\right]$ and $\left[\frac{dt'}{(1+t')}\right]$; their coefficients are determined by the characteristics of the initial position of equilibrium. What can we say about the signs of these coefficients? It is clear that as the elasticities of substitution in consumption are always positive, as those in production are always negative, and as all other terms in A and B are positive and less than unity, both A and B must be positive. They are the smaller, the smaller are the numerical values of the elasticities of substitution. In the extreme case in which all the four elasticities of substitution vanish, A and B must vanish as well.

The sign of the third term, D, is less certain. If, however, it is written in the form

$$D=1-(\pi'+\pi'')+\pi'.\pi''.\left[1-\frac{1}{(1+t')(1+t'')}\right]$$

it becomes clear that it must be positive whenever the sum of the marginal propensities to consume import goods is less than unity. This is usually regarded as the normal case; consumers' indifference systems seem to be always "tilted" against import goods. If, therefore, we neglect exceptional cases in which $(\pi'+\pi'')$ is as much greater than unity as to compensate the positive element $\pi'.\pi''.\left[1-\frac{1}{(1+t')(1+t'')}\right]$, we may expect the term D to be positive as well.

V

The interpretation of the above relation is as follows. Formula (i) does not tell us how a certain change in tariffs will affect the balance of trade unless we know how it will affect the world market prices. If we have reasons to expect that the latter will not be affected at all, i.e., that $\left[\frac{dp_y}{p_y}\right]=\left[\frac{dp_x}{p_x}\right]=0$, the effect of a change in tariffs on the balance of trade is given by the last term only, i.e., $\left[\frac{db}{I'}\right] = -\frac{A}{D}\cdot\left[\frac{dt'}{(1+t')}\right]$. If the sum $(\pi' + \pi'')$ is less than unity, D is positive, and higher tariffs must lead to a smaller deficit (or greater surplus) of the balance of trade; and this effect is the stronger, the greater are the two elasticities of substitution in Country I, i.e., the greater is A.

If the world market prices are not unaffected, the relation between tariffs and the balance of trade is complicated by the three terms involving $\left[\frac{dp_y}{p_y}\right]$ and $\left[\frac{dp_x}{p_x}\right]$. It is easy to prove that if we define the terms of trade as the price of imports in terms of exports, i.e., as $\frac{p_y}{p_x}$, a *small* proportional change in the terms of trade must be equal to the difference between the proportional changes in the two prices, i.e., it must be equal to $\left[\frac{dp_y}{p_y} - \frac{dp_x}{p_x}\right]$. A rise, for instance, in the price of imports by 5 per cent., accompanied by a rise in the price of exports by 2 per cent., represents a deterioration in the terms of trade by 3 per cent. Thus the third element on the right-hand side of (i) is relevant only if the prices change in such a way as to represent a change in the terms of trade, i.e., if the difference $\left[\frac{dp_y}{p_y} - \frac{dp_x}{p_x}\right]$ does not vanish.

The effect of a change in the terms of trade on the balance of trade depends on the coefficient $-\frac{A+R.B}{D}$. It is the stronger, the greater (numerically) are all the four elasticities of substitution; its sign, however, is negative (if the sum $\pi' + \pi''$ is less than unity). This means that a deterioration in the terms of trade, i.e., a rise in the price of imports in terms of exports, has a favourable effect on the balance of trade in the sense that it tends to reduce its deficit (or increase its surplus).

At first sight this is a surprising result. We must, however, bear in mind that the third term on the right-hand side of formula (i) measures the change in the balance of trade (in proportion to the value of imports), which is due not to the direct effect of the changes in the *prices* of exports and imports, but to the changes in the *quantities* of exports and imports, *induced* by the changes in prices. And these are in line with the general observation that the quantities traded should move in the opposite direction to prices. A change in prices in favour of import goods, i.e., a deterioration in the terms of trade, tends to change the quantities traded in favour of exports, i.e., to improve the balance of trade. This is, no doubt, a very inconclusive way of putting things. Too many forces, however, combine to bring this result for common-sense methods to be of much help in tracing out their ultimate effect.

The direct effect of the change in prices is given by the first two terms of the formula. A rise in the price of imports means an increase in the value of imports; and, other things remaining the same, the proportion of the resulting *increase* of the deficit (or reduction of surplus) to the initial value of imports must be the same as the proportion of the change in the price of imports. Hence the coefficient of the term $\left[\frac{dp_y}{p_y}\right]$ is unity. A rise in the price of exports means a *decrease* of the deficit (or increase of surplus) in proportion to the value not of imports but of exports; hence the coefficient of the term $\left[\frac{dp_x}{p_x}\right]$ is $-R$.

To summarise, there are the following forces at work on the balance of trade. First, the direct effect of a rise in the price of a given volume of imports or fall in the price of a given volume of exports is to worsen the balance of trade; and vice versa. Secondly, a deterioration in the terms of trade means a change in the internal price ratios and tends to produce adjustments in the volume of imports and exports amounting to an improvement in the balance of trade; and vice versa. Third, the latter tendency is supplemented by the direct effect of an increase in tariffs (the last term in the formula) which affects the internal price ratio in the country concerned in addition to how it is affected by the change in the terms of trade and results in such adjustment in the quantities traded that the balance of trade tends to improve. The validity of the last two conditions depends upon the assumption that the sum of the marginal propensities to consume import goods is less than unity.

VI

The relation expressed in formula (i) is independent of any other condition of equilibrium except those listed under (*a*) – (*e*) above. The formula may be, therefore, applied to any problem in the theory of tariffs provided only that we make the necessary assumptions with respect to some of the variables.

First, we may apply it to the problem of the effect of tariffs on the terms of trade in conditions of balanced trade. All we have to do is to take $\left[\frac{db}{I'}\right]=0$ (trade is and remains balanced) and $\left[\frac{dp_x}{p_x}\right]=0$ (X is the numeraire and, therefore, there cannot be any change in its price). The answer is given by the remaining terms of the formula, i.e.,

$$\left[\frac{dp_y}{p_y}\right]=\frac{A}{D-(A+R.B)}\cdot\left[\frac{dt'}{(1+t')}\right] \quad \ldots\ldots\ldots\ldots\ldots(\text{ii})$$

Higher tariffs would lead to a higher price of imports in terms of exports, i.e., they would turn the terms of trade against the country raising the tariffs, only if all the elasticities of substitution and the marginal propensities to consume import goods were so small, i.e., $(A+R.B)$ so small and D positive and so large, as to make the denominator $D-(A+R.B)$ positive.

Second, we have the problem of the effect of tariffs on the balance of trade in conditions of constant rates of exchange and constant money prices of export goods in both countries.[1] These conditions mean that world market prices cannot change at all, i.e., $\left[\frac{dp_y}{p_y}\right] = \left[\frac{dp_x}{p_x}\right] = 0$ and the solution is $\left[\frac{db}{I'}\right] = -\frac{A}{D} \cdot \left[\frac{dt'}{(1+t')}\right]$.
The result depends on the direct effect of a change in the tariff only; if the sum of the marginal propensities to consume import goods is less than unity, higher tariffs must lead to a smaller deficit (or greater surplus) of the balance of trade.

Finally, we have a mixed case in which the assumption that the two countries are stabilising the prices of their export goods remains valid but in which we are interested not in the effect of tariffs on the balance of trade in the conditions of constant rates of exchange, but in the effect of tariffs on the rates of exchange in the conditions of a constant balance of trade. The conditions of the problem are thus that if we express all prices in the currency of the country raising its tariffs, $\left[\frac{db}{I'}\right] = 0$, $\left[\frac{dp_x}{p_x}\right] = 0$, and the solution is given by formula (ii); as the price of Y is constant in the other country's currency, changes in the rate of exchange must be identical with changes in the terms of trade.

In the present article, we are interested in the effect of tariffs on the balance of trade. Is it, however, legitimate to assume that the world market prices of imports and exports must remain unchanged? What this assumption amounts to is, in fact that in order to maintain internal balance both countries adopt such monetary and fiscal policies as will result in a constant level of prices of their export goods. This might be a sensible policy if the countries concerned produced no other goods except those which they are exporting; to say that they are stabilising the prices of their export goods would be then the same thing as to say that they are stabilising the prices of all goods they are producing. If, however, they are producing import goods as well (and this is, no doubt, the most likely case), the assumption that in order to maintain internal balance they must stabilise prices of their export goods is no less arbitrary than that they must stabilise the prices of their import goods. But from the point of view of the effect of tariffs on the balance of trade it is by no means irrelevant which alternative we choose. The difference between them is that in the latter case, i.e., if the two countries are stabilising the home market prices of their import goods, the rules of the game are not $\left[\frac{dp_y}{py}\right] = \left[\frac{dp_x}{p_x}\right] = 0$ but $\left[\frac{dp'_y}{p'_y}\right] = \left[\frac{dp''_x}{p''_x}\right] = 0$. Or, as a change in the home market prices of import goods is always equal to the change in their world market prices plus the change in the tariffs, i.e.,

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[1] See J. E. Meade, *A Geometry of International Trade*, 1952, pp. 47 and 80/81.

$$\left[\frac{dp'_y}{p_y}\right]=\left[\frac{dp_y}{p_y}\right]+\left[\frac{dt'}{(1+t')}\right] \text{ and } \left[\frac{dp''_x}{p''_x}\right]=\left[\frac{dp_x}{p_x}\right]$$

the rules of the game are—

$$\left[\frac{dp_y}{p}\right]=-\left[\frac{dt'}{(1+t')}\right] \text{ and } \left[\frac{dp_x}{p_x}\right]=0.$$

Substituting in (i) we obtain

$$\left[\frac{db}{I'}\right]=\left(R.\frac{B}{D}-1\right)\cdot\left[\frac{dt'}{(1+t')}\right].$$

Thus in this case the effect of a change in tariffs on the balance of trade depends not on the elasticities of substitution in the country making the change in tariffs, but on those in the rest of the world (on B instead of on A as in the former case); and the effect in this case may also be of the opposite sign. Only if the numerical values of the elasticities of substitution and the sum of the marginal propensities to consume import goods are so small (i.e., B so small and D so large) that $R.\frac{B}{D}$ is less than unity, would higher tariffs lead to an improvement of the balance of trade; otherwise the balance of trade would deteriorate. And in these cases in which the sum of the marginal propensities to consume import goods is so large that the denominator D is negative, higher tariffs, instead of making the balance of trade worse, would make it better, irrespective of what are the numerical values of the elasticities of substitution.

VII

The above analysis reveals a very unsatisfactory state of affairs. As it turns out arbitrary assumptions about changes in prices are not harmless simplifications; they lead to arbitrary results. Unless, therefore, we manage to do without them, we cannot say that we have *solved* the problem; we have only *disposed* of it, by assuming a certain solution. The crux of the matter is that tariffs do affect world market prices, and that the way in which they affect them determines their ultimate effect on the balance of trade.

What can be said about the effect of tariffs on the world market prices on common-sense grounds? We may argue that higher tariffs lead to higher home market prices of import goods (Y) and to a boom in the industries producing the same commodities at home; in order to maintain internal balance this must be offset by some deflationary measures which tend to depress the prices of export goods (X); a fall in those prices leads to a depression in the industries producing the same commodities in the rest of the world; it must be offset by some inflationary measures abroad, and these tend to push up the world market prices of import goods of the country raising its tariffs (Y).

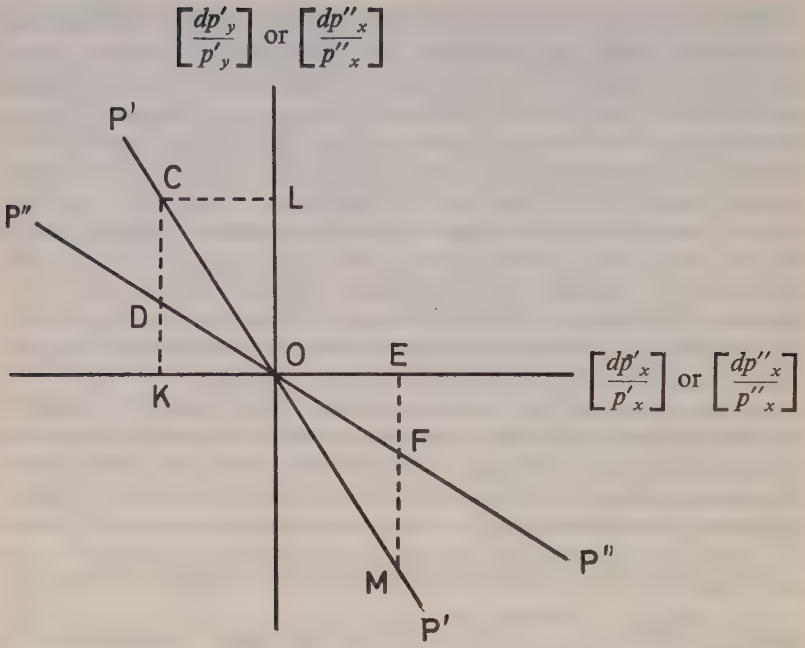
But we may just as well argue the other way round. We may say that higher tariffs tend to depress the world market prices of import goods (Y); this leads to a depression in the industries producing those goods abroad, and some inflationary measures are required there to maintain internal balance; these tend to push up the prices of the commodities which the rest of the world is importing from the country raising its tariffs (X); and the resulting boom in the latter country's export industries requires some deflationary measures which tend to depress the home market prices of its import goods (Y). So far, therefore, the analysis is inconclusive. Starting at one end of the process, tariffs seem to depress the prices of exports and to raise the prices of imports; but starting from the other end they seem to depress the prices of imports and to raise the prices of exports.

It seems, however, that we can do a little better than that. Consider first the changes in the home market prices which are consistent with the condition of internal balance. Suppose that we know that if, for instance, the price of one commodity goes up by 10 per cent. the deflationary measures required to maintain internal balance will result in the fall of the price of the other commodity by 5 per cent. Or, more generally, that a change in the price of commodity Y in the proportion $\left[\frac{dp'_y}{p'_y}\right]$ (or $\left[\frac{dp''_y}{p''_y}\right]$) must be accompanied by a change in the price of X in the proportion $\left[\frac{dp'_x}{p'_x}\right]$ (or $\left[\frac{dp''_x}{p''_x}\right]$).

The relation between such proportional changes in the prices in Country I as are consistent with the condition of internal balance are represented by the line $P'P'$ on the diagram on p. 140. It may be called Country I's price reaction line. Proportional changes in the home market price of Y (i.e., $\left[\frac{dp'_y}{p'_y}\right]$) are measured along the vertical axis and those in the home market price of X (i.e., $\left[\frac{dp'_x}{p'_x}\right]$) along the horizontal axes. For instance, to a rise in the price of Y in the proportion equal to OL there corresponds a fall in the price of X in the proportion equal to KO; if the former price falls in the proportion EM, the latter must rise in the proportion OE, etc.

Suppose further that $P''P''$ represents the price reaction line in Country II. If it is less steep than $P'P'$, the same changes in the price of X correspond to smaller changes in the price of Y in Country II than in Country I; if $P''P''$ is steeper than $P'P'$ the price of Y must change more in Country II than in Country I. Neither $P'P'$ nor $P''P''$ is necessarily a straight line. But if the contemplated changes in prices are very small, and this is an essential limitation of the analysis given in this article, $P'P'$ and $P''P''$ may be approximated by straight lines.

If we know the shape of the two price reaction lines (their slopes if they are approximated by straight lines), the effect of a change in tariffs


$\left[\frac{dp'_y}{p'_y}\right]$ or $\left[\frac{dp''_x}{p''_x}\right]$
P'
C
L
P''
D
O
E
K
$\left[\frac{dp'_x}{p'_x}\right]$ or $\left[\frac{dp''_x}{p''_x}\right]$
F
P''
M
P'

on the prices of exports and imports is determined by the following construction. We have the already familiar relations $\left[\frac{dp'_x}{p'_x}\right]=\left[\frac{dp_x}{p_x}\right]=\left[\frac{dp''_x}{p''_x}\right]$ and $\left[\frac{dp'_y}{p'_y}\right]=\left[\frac{dp_y}{p_y}\right]+\left[\frac{dt'}{(1+t')}\right]=\left[\frac{dp''_y}{p''_y}\right]+\left[\frac{dt'}{(1+t')}\right]$. They say that as Country II's tariff on *X* is constant, the price of *X* in Country II must always change in the same direction and in the same proportion as the price of *X* in Country I (the latter being the world market price). And, as Country I's tariff on *Y* is variable, the change in the price of *Y* in Country I must be always greater than that in Country II (the world market price) by the change in the tariff. The solution which satisfies these two relations is that the proportional change in the price of *X* (the same in both countries) is *KO*; the proportional change in the price of *Y* in Country II (in the country exporting *Y*) is *KD*; the given increase in the tariff in proportion to the multiplicand $(1+t')$, put on top of *KD*, is *DC*; and the proportional change in the price of *Y* in Country I (in the country importing *Y*) is *KC*. If, therefore, the price reaction line of Country I is steeper than the price reaction line of Country II (*P′P′* steeper than *P″P″*), higher tariffs lead to a fall in the price of exports, and to a rise in the price of imports; the terms of trade move against the country imposing the tariff. If, however, the price reaction line in the country making the change in tariffs were less steep, the solution would be on the other side of the diagram; the same change in the tariff ($DC=FM$)

would lead to a rise in the price of exports in the proportion equal to *OE*, and to a fall in the world market price of imports in the proportion equal to *EM*, the latter being greater than the fall in the home market price of imports (*EF*) by the change in the tariff (*FM*).

VIII

The above analysis does not provide us with the solution of our problem; it only shifts its burden. Instead of having to determine the changes in prices we have to determine the slopes of the price reaction lines. Incidentally, it may be shown that arbitrary assumptions about the prices derive from arbitrary assumptions about the price reaction lines. The assumption, for instance, that both countries are stabilising the prices of their export goods amounts to the same thing as to assume that the price reaction line of Country I coincides with the vertical axis and that of Country II with the horizontal axis. The opposite is meant by the assumption that both countries are stabilising the home market prices of their import goods.

The difficulty, however, is that as the price reaction lines represent the relationship between such changes in prices as are consistent with internal balance, their slopes must depend on how we define internal balance. It seems, therefore, that we have reached the stage at which we cannot postpone any further the tightening up of what so far has been left as a loose end; we have to say what interpretation of the policy of internal balance is to be regarded as a formal constraint in our model. If we reject the interpretation that the countries concerned are stabilising the prices of their export goods (or import goods) we have to put something in its place; otherwise the solution must be indeterminate. Unfortunately, any formal interpretation of the policy of internal balance must be arbitrary to a certain degree. All we can do, therefore, is merely to choose an interpretation which in spite of being arbitrary could be accepted as more legitimate than those mentioned before.

The interpretation which we shall use in the remaining parts of this article is that in order to maintain internal balance both countries are stabilising their money incomes at factor cost. As there are no indirect taxes on home produced goods (Assumption 4), this means that both countries are stabilising the money values of their total production. An arbitrary assumption behind this interpretation is that constant income at factor cost and full employment of productive resources must always go together. It seems, however, that in static conditions this would be the policy which many practical economists would recommend as a sensible way to avoid inflationary or deflationary pressures. In the special case in which no import goods are produced in the importing countries, the condition of a constant money value of production is identical with that of constant prices of export goods; as the latter represent then all goods produced, the volume of their output (as determined by the available productive resources) must be constant, and the constant money value of production must imply constant money prices. If, however, import goods are produced as well, constant money income at factor cost seems to be a more legitimate condition of internal balance than constant money prices of either export goods or import goods.

IX

If the above interpretation is accepted the argument can be developed on the following lines. The condition of a constant money value of production enables us to determine the slopes of the two price reaction lines. The details of the argument are given again in the Appendix. The result is that the slopes of the price reaction lines are independent of the numerical values of the elasticities of substitution and the marginal propensities to consume; they are determined by the proportions in which incomes in the respective countries are derived from the production of export goods and import goods. The relevant formulæ are:

$$\frac{CK}{KO} = -\left[\frac{dp'_y}{p'_y}\right] : \left[\frac{dp'_x}{p'_x}\right] = \frac{(1-\Omega')}{\Omega'} \qquad \text{............(iii)}$$

and

$$\frac{DK}{KO} = -\left[\frac{dp''_y}{p''_y}\right] : \left[\frac{dp''_x}{p''_x}\right] = \frac{\Omega''}{(1-\Omega'')}.$$

In other words if, for instance, the share of import goods in the total value of production is $\frac{1}{4}$, and that of export goods is $\frac{3}{4}$, a rise in the price of the latter by 1 per cent. must be accompanied by a fall in the price of the former by 3 per cent.

The condition for the relative positions of the price reaction lines to be as on the diagram is thus—

$$\frac{\Omega''}{(1-\Omega'')} < \frac{(1-\Omega')}{\Omega'}$$

$$\therefore (\Omega' + \Omega'') < 1.$$

If this condition is satisfied, the solution is on the left-hand side of the diagram, and higher tariffs lead to higher world market prices of imports, to lower world market prices of exports, to a deterioration of the terms of trade, and (if the sum of the marginal propensities to consume import goods is less than unity and the elasticities of substitution are sufficiently high) to an improvement of the balance of trade. If the sum of the proportions $(\Omega' + \Omega'')$ is greater than unity, the solution is on the right-hand side of the diagram, and higher tariffs lead to an improvement of the balance of trade only if the sum of the marginal propensities to consume import goods is greater than unity or if the elasticities of substitution are very small.

The results obtained so far are summarised in the table.

The effects of tariffs on the terms of trade and on the balance of trade depend on the numerical values of three coefficients: on the sum of the

Row	$(\pi' + \pi'')$	$(\Omega' + \Omega'')$	$\epsilon', \epsilon'', \eta', \eta''$	The effects of tariffs on	
				the terms of trade	the balance of trade
1	< 1	< 1	large	unfavourable	favourable
2			small	unfavourable	unfavourable
3		> 1	large	favourable	uncertain[1]
4			small	favourable	favourable
5	> 1	< 1	large	unfavourable	uncertain[1]
6			small	unfavourable	unfavourable
7		> 1	large	favourable	uncertain[1]
8			small	favourable	favourable

marginal propensities to consume import goods $(\pi' + \pi'')$, on the elasticities of substitution $(\epsilon', \epsilon'', \eta', \eta'')$, and on the sum of the shares of import goods in the money values of the total production $(\Omega' + \Omega'')$. The eight rows of the table show the effect of tariffs on the terms of trade and on the balance of trade corresponding to all possible combinations of these coefficients.

The case in which the sum of the marginal propensities to consume import goods is less than unity (i.e., in which D is positive) is usually regarded as the normal case; the consumers' scales of preferences are supposed to be "tilted" against import goods. Can we say anything of this kind about the sum of the proportions $(\Omega' + \Omega'')$? It seems that we can if we extend the principle of the scales of preference being tilted against import goods to the sum of the average propensities as well. Then we have

$$(\theta' + \theta'') < 1 \qquad \text{.......................(iv)}$$

and this implies

$$\frac{\theta''}{(1 - \theta'')} < \frac{(1 - \theta')}{\theta'}.$$

As, however, consumption of import goods is always greater than their production in the importing country (by the volume of imports), and consumption of export goods is less than their production (by the volume of exports), we have

$$\frac{(1 - \theta')}{\theta'} < \frac{(1 - \Omega')}{\Omega'} \qquad \text{.......................(v)}$$

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[1] The effect of tariffs on the balance of trade is uncertain in rows 3, 5 and 7. In row 3 the sum of the marginal propensities to consume import goods is less than unity; hence D in formula (i) is positive. The change in the terms of trade is favourable; hence $(dp_y/p_y - dp_x/p_x)$ is negative. As the elasticities of substitution are large, the third and the fourth elements on the right-hand side of formula (i) cannot be neglected; but they work in the opposite directions, and the ultimate change in the balance of trade depends on the relative magnitudes of all the four elements in (i). In rows 5 and 7 the elasticities of substitution are large as well. As, however, the sum of the marginal propensities to consume import goods is greater than unity, D may be positive as well as negative, and the signs of the third and the fourth elements in (i) are uncertain.

and $$\frac{\theta''}{(1-\theta'')} > \frac{\Omega''}{(1-\Omega'')}.$$

It follows that $(\theta' + \theta'') < 1$ implies also $\frac{\Omega''}{(1-\Omega'')} < \frac{(1-\Omega')}{\Omega'}$

and $$(\Omega' + \Omega'') < 1.$$

In other words, if the sum of the average propensities to consume import goods is less than unity, the sum of the proportions $(\Omega' + \Omega'')$ must be also less than unity, and the relative positions of the price reaction lines must be as on the diagram ($P'P'$ steeper than $P''P''$). If the sum of the average propensities to consume import goods is greater than unity, the sum of the proportions $(\Omega' + \Omega'')$ may still be less than unity; in order for it to be greater than unity the sum $(\theta' + \theta'')$ must be as large as to compensate the differences in (v).

This gives us the solution of our problem. We can say that in the normal case (in which the sums of both marginal and average propensities to consume import goods are less than unity) tariffs imposed for balance-of-payments reasons should have an unfavourable effect on the terms of trade. They should lead to an improvement in the balance of trade if import goods and export goods are easily substitutable one for the other, in consumption and/or in production (row 1 in the table above); if they are not, (row 2 in the table above), the favourable effect of the changes in the volume of exports and imports upon the balance of trade may not suffice to compensate the unfavourable effect of the changes in prices.

X

The above analysis is subject to several limitations. First, we have all the restrictive assumptions of general equilibrium, comparative statics and a two-country-two-commodity world; they are too familiar to be discussed here. Second, we have an arbitrary interpretation of the policy of internal balance. We cannot do much about it either; the interpretation must either be accepted or rejected. And third, our analysis applies to small changes only. The application of our conclusions to finito changes in tariffs must imply the assumption that the relation between changes in tariffs and in the balance of trade remains the same over the relevant range.

Whether the analysis with all these simplifications and arbitrary assumptions can be a basis for wider generalisations is a matter for judgment. If, however, it can, the inference must be that the ultimate effect of tariffs on the balance of trade and on the terms of trade may not be as favourable as may at first sight seem to be the case. It is true that the impact effect of tariffs is to restrict the volume of imports, to depress the world market prices of imports and to improve, therefore, both the balance of trade and the terms of trade. But if we allow for all those adjustments in production, in consumption, and in the monetary sectors of the countries concerned, which must result from changes in the relative prices in the conditions of internal balance, the ultimate effect may be different from the impact effect. The terms of trade are likely to become less favourable than they were before the change in tariffs, and if there is not much ease in substitution of import goods for export goods in production and in consumption, the improvement in the balance of trade may not last longer than the initial stages of adjustment. It may be argued on the grounds of the offer-curve analysis that if the deficit of the balance of trade is reduced by means of tariffs, the deterioration in the terms of trade must be less than if the same objective is achieved in some other way, without any change in tariff. It must not, however, be expected that tariffs would permit us to achieve a definite improvement in the balance of trade without any unfavourable adjustments in the terms of trade at all.

APPENDIX

1. Let the conditions of demand in Country I be given in the form of the function

$$\frac{Y'}{X'} = F'(p'_x, p'_y, E').$$

The quantities demanded (Y' and X') are uniquely determined by the home market prices (p'_x and p'_y) and the total expenditure (E'). Differentiating and multiplying by $\frac{X'}{Y'}$, we obtain

$$\frac{dY'}{Y'} - \frac{dX'}{X'} = \frac{X'}{Y'} \cdot \frac{\partial F'}{\partial p'_x} \cdot dp'_x + \frac{X'}{Y'} \cdot \frac{\partial F'}{\partial p'_y} \cdot dp'_y + \frac{X'}{Y'} \cdot \frac{\partial F'}{\partial E'} \cdot dE' \quad \ldots\ldots \text{(i)}$$

2. In order to eliminate the partial coefficients $\frac{\partial F'}{\partial p'_x}$ and $\frac{\partial F'}{\partial p'_y}$ let us write

$$\pi' = \frac{\partial Y'}{\partial E'} \cdot p'_y = 1 - \frac{\partial X'}{\partial E'} \cdot p'_x$$

where π' is the marginal propensity to consume Y (the commodity imported in Country I). It follows that

$$\frac{\partial F'}{\partial E'} = \frac{1}{X'} \cdot \frac{\partial Y'}{\partial E'} - \frac{Y'}{(X')^2} \cdot \frac{\partial X'}{\partial E'} = \frac{1}{X' \cdot p'_y} \cdot \left[\frac{E'}{X' \cdot p'_x} \cdot \pi' - \frac{Y' \cdot p'_y}{X' \cdot p'_x}\right] \quad \ldots\text{(ii)}$$

Elasticity of substitution of Y for X on the side of consumption is defined as

$$\epsilon' = \left[d\left(\frac{Y'}{X'}\right) : d\left(\frac{p'_x}{p'_y}\right)\right] \cdot \frac{X' \cdot p'_x}{Y' \cdot p'_y}$$

subject to the condition that the total expenditure is so adjusted that the same quantities of both goods can be bought after a change in the price ratio as were bought before the change. This means that

$$\epsilon' = \frac{X' \cdot p'_x}{Y' \cdot p'_y} \cdot \left[\frac{\partial F'}{\partial p'_x} \cdot \frac{dp'_x}{d\left(\frac{p'_x}{p'_y}\right)} + \frac{\partial F'}{\partial p'_y} \cdot \frac{dp'_y}{d\left(\frac{p'_x}{p'_y}\right)} + \frac{\partial F'}{\partial E'} \cdot \frac{dE'}{d\left(\frac{p'_x}{p'_y}\right)}\right]$$

subject to the condition that $dE' = Y' \cdot dp'_y + X' \cdot dp'_x$. Taking p'_y as constant, i.e.,

$$dp'_y = 0,\ d\left(\frac{p'_x}{p'_y}\right) = \frac{dp'_x}{p'_y} \text{ and } \frac{dE'}{dp'_x} = X'$$

we have

$$\epsilon' = \frac{X' \cdot p'_x}{Y' \cdot p'_y} \cdot \left[\frac{\partial F'}{\partial p'_x} \cdot p'_y + \frac{\partial F'}{\partial E'} \cdot X' \cdot p'_y \right]$$

If we re-arrange the elements and substitute (ii), we obtain

$$\frac{\partial F'}{\partial p'_x} = \frac{Y'}{X' \cdot p'_x} \cdot \left[\epsilon' - \frac{E' \cdot \pi'}{Y' \cdot p'_y} + 1 \right] \quad \text{..............(iii)}$$

Similarly, if we take p'_x as constant, i.e., if

$$dp'_x = 0,\ d\left(\frac{p'_x}{p'_y}\right) = -\frac{p'_x}{p'_y} \cdot \frac{dp'_y}{p'_y} \text{ and } \frac{dE'}{dp'_y} = Y'$$

we have

$$\epsilon' = -\frac{X' \cdot p'_x}{Y' \cdot p'_y} \cdot \left[\frac{\partial F'}{\partial p'_y} \cdot \frac{p'_y}{p'_x} \cdot p'_y + \frac{\partial F'}{\partial E'} \cdot \frac{p'_y}{p'_x} \cdot Y' \cdot p'_y \right]$$

$$\therefore \frac{\partial F'}{\partial p'_y} = -\frac{Y'}{X' \cdot p'_y} \cdot \left[\epsilon' + \frac{E' \cdot \pi'}{X' \cdot p'_x} - \frac{Y' \cdot p'_y}{X' \cdot p'_x} \right] \quad \text{............(iv)}$$

Substituting (ii), (iii) and (iv) in (i), we obtain

$$\frac{dY'}{Y'} - \frac{dX'}{X'} = \left[\epsilon' - \frac{E' \cdot \pi'}{Y' \cdot p'_y} + 1 \right] \cdot \frac{dp'_x}{p'_x} - \left[\epsilon' + \frac{E' \cdot \pi'}{X' \cdot p'_x} - \frac{Y' \cdot p'_y}{X' \cdot p'_x} \right] \cdot \frac{dp'_y}{p'_y} + $$
$$+ \frac{E'}{Y' \cdot p'_y} \cdot \left[\frac{E' \cdot \pi'}{X' \cdot p'_x} - \frac{Y' \cdot p'_y}{X' \cdot p'_x} \right] \cdot \frac{dE'}{E'} \quad \text{..................(v)}$$

The result is a linear relation between proportional changes in five quantities: in the quantities of the two commodities consumed $\frac{dY'}{Y'}$ and $\frac{dX'}{X'}$, in their home market prices $\frac{dp'_y}{p'_y}$ and $\frac{dp'_x}{p'_x}$, and in total expenditure $\frac{dE'}{E'}$.

3. In order to eliminate $\frac{dE'}{E'}$ let us write the identity

$$E' = X' \cdot p'_x + Y' \cdot p'_y .$$

By differentiation we have

$$dE' = dX' \cdot p'_x + dY' \cdot p'_y + X' \cdot dp'_x + Y' \cdot dp'_y .$$

Substituting in (v) and collecting terms we obtain

$$\frac{E' \cdot \pi'}{Y' \cdot p'_y} \cdot \frac{dX'}{X'} - \frac{E' \cdot (1 - \pi')}{X' \cdot p'_x} \cdot \frac{dY'}{Y'} = \epsilon' \cdot \left(\frac{dp'_y}{p'_y} - \frac{dp'_x}{p'_x} \right) \text{........(vi)}$$

This leaves us with four variables only, with the proportional changes in the two quantities consumed and the proportional changes in the two prices.

4. Finally, for the reasons which will become apparent presently, let us write the identity

$$X' + X'' = x' + x''.$$

It says that the sum of the quantities consumed in both countries together must be equal to the sum of the quantities produced. By differentiation we have

$$dX' = dx' + dx'' - dX''.$$

If we substitute this result for (vi), multiply by $(1-\phi')=\frac{X'.p'_x}{E'}$ and change signs, we obtain

$$(1-\pi').\frac{dY'}{Y'}+\frac{X''.p'_x}{Y'.p'_y}.\pi'.\frac{dX''}{X''}=-(1-\phi').\epsilon'.\left(\frac{dp'_y}{p'_y}-\frac{dp'_x}{p'_x}\right)+$$
$$+\frac{x'.p'_x}{Y'.p'_y}.\pi'.\frac{dx'}{x'}+\frac{x''.p'_x}{Y'.p'_y}.\pi'.\frac{dx''}{x''} \quad \ldots\ldots\ldots\ldots\ldots(\text{vii})$$

This equation is for the time being to be regarded as final.

5. Now the same argument must be applied to Country II. As, however, the procedure is exactly the same as with respect to Country I, it is not necessary to do it step by step. A few lines will suffice to arrive at the final result. If we take into account that Country II is importing not commodity Y but X, it must be clear that to write equation (vi) for Country II we have only to change the index of the country and to put $(1-\pi'')$ in place of π'. And if we write the identity

$$dY''=dy'+dy''-dY'$$

we obtain

$$\frac{Y'.p''_y}{X''.p''_x}.\pi''.\frac{dY'}{Y'}+(1-\pi'').\frac{dX''}{X''}=(1-\phi'').\epsilon''.\left(\frac{dp''_y}{p''_y}-\frac{dp''_x}{p''_x}\right)+$$
$$+\frac{y'.p''_y}{X''.p''_x}.\pi''.\frac{dy'}{y'}+\frac{y''.p''_y}{X''.p''_x}.\pi''.\frac{dy''}{y''} \quad \ldots\ldots\ldots\ldots(\text{viii})$$

This corresponds to equation (vii) for Country I.

6. As the next step let us take the conditions of supply. The definition of the elasticity of substitution of export goods for import goods on the side of production is

$$\eta'=\frac{d\left(\frac{y'}{x'}\right)}{d\left(\frac{p'_x}{p'_y}\right)}.\frac{x'.p'_x}{y'.p'_y}$$

for Country I. It is applicable to any displacement of equilibrium. It follows therefore that

$$\eta'.\left(\frac{dp'_x}{p'_x}-\frac{dp'_y}{p'_y}\right)=\frac{dy'}{y'}-\frac{dx'}{x'} \quad \ldots\ldots\ldots\ldots\ldots(\text{ix})$$

We know, however, that in equilibrium relative prices must be equal to opportunity costs, i.e.,

$$\frac{p'_x}{p'_y}=-\frac{dy'}{dx'}.$$

Substituting in (ix) and re-arranging we obtain

$$\frac{dx'}{x'}=-\Omega'.\eta'.\left(\frac{dp'_x}{p'_x}-\frac{dp'_y}{p'_y}\right)\ldots\ldots\ldots\ldots\ldots\ldots(\text{x})$$

and

$$\frac{dy'}{y'}=(1-\Omega').\eta'.\left(\frac{dp'_x}{p'_x}-\frac{dp'_y}{p'_y}\right)\ldots\ldots\ldots\ldots\ldots(\text{xi})$$

where Ω' is the proportion of the money value of production of import goods to the money value of the total production in Country I. For Country II we have

$$\frac{dx''}{x''} = -(1-\Omega'') \,.\, \eta'' \,.\, \left(\frac{dp''_x}{p''_x} - \frac{dp''_y}{p''_y}\right) \quad \ldots\ldots\ldots\ldots(\text{xii})$$

and

$$\frac{dy''}{y''} = \Omega'' \,.\, \eta'' \,.\, \left(\frac{dp''_x}{p''_x} - \frac{dp''_y}{p''_y}\right) \quad \ldots\ldots\ldots\ldots\ldots(\text{xiii})$$

If we substitute (x) and (xii) in (vii) and collect terms, we obtain

$$\begin{aligned}(1-\pi') \,.\, \frac{dY'}{Y'} + \frac{X'' \,.\, p'_x}{Y' \,.\, p'_y} \,.\, \pi' \,.\, \frac{dX''}{X''} = \left[(1-\phi') \,.\, \epsilon' - \frac{x' \,.\, p'_x}{Y' \,.\, p'_y} \,.\, \Omega' \,.\, \pi' \,.\, \eta'\right] . \\ \left(\frac{dp'_x}{p'_x} - \frac{dp'_y}{p'_y}\right) - \left[\frac{x'' \,.\, p'_x}{Y' \,.\, p'_y} \,.\, (1-\Omega'') \,.\, \pi' \,.\, \eta''\right] . \left(\frac{dp''_x}{p''_x} - \frac{dp''_y}{p''_y}\right) \ldots\ldots(\text{xiv})\end{aligned}$$

Similarly, if we substitute (xi) and (xiii) in (viii), we obtain

$$\begin{aligned}\frac{Y' \,.\, p''_y}{X'' \,.\, p''_x} \,.\, \pi'' \,.\, \frac{dY'}{Y'} + (1-\pi'') \,.\, \frac{dX''}{X''} = \left[-(1-\phi'') \,.\, \epsilon'' + \right. \\ \left. + \frac{y'' \,.\, p''_y}{X'' \,.\, p''_x} \,.\, \Omega'' \,.\, \pi'' \,.\, \eta''\right] . \left(\frac{dp''_x}{p''_x} - \frac{dp''_y}{p''_y}\right) + \left[\frac{y' \,.\, p''_y}{X'' \,.\, p''_x} \,.\, (1-\Omega') \,.\, \pi'' \,.\, \eta'\right] . \\ \left(\frac{dp'_x}{p'_x} - \frac{dp'_y}{p'_y}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(\text{xv})\end{aligned}$$

These two equations represent the relations between the proportional changes in the quantities consumed $\left(\frac{dY'}{Y'} \text{ and } \frac{dX''}{X''}\right)$ and the proportional changes in the home market prices $\left(\frac{dp'_x}{p'_x}, \frac{dp'_y}{p'_y}, \frac{dp''_x}{p''_x} \textit{ and } \frac{dp''_y}{p''_y}\right)$.

7. The domestic prices of our two products must move in the same proportion as their world market prices except in so far as there is a change of import duty. We have, therefore, $\frac{dp'_x}{p'_x} = \frac{dp_x}{p_x}$, $\frac{dp'_y}{p'_y} = \frac{dp_y}{p_y} + \frac{dt'}{(1+t')}$, $\frac{dp''_x}{p''_x} = \frac{dp_x}{p_x}$, and $\frac{dp''_y}{p''_y} = \frac{dp_y}{p_y}$. Substituting in (xiv) and (xv) we obtain:-

$$\begin{aligned}(1-\pi') \,.\, \frac{dY'}{Y'} + \frac{X'' \,.\, p_x}{Y' \,.\, p_y} \,.\, \frac{\pi'}{(1+t')} \,.\, \frac{dX''}{X''} = \left[(1-\phi') \,.\, \epsilon' - \frac{x' \,.\, p_x}{Y' \,.\, p_y} \,.\, \frac{\Omega' \,.\, \pi' \,.\, \eta'}{(1+t')} + \right. \\ \left. - \frac{x'' \,.\, p_x}{Y' \,.\, p_y} \,.\, \frac{(1-\Omega'')}{(1+t')} \,.\, \pi' \,.\, \eta''\right] . \left(\frac{dp_x}{p_x} - \frac{dp_y}{p_y}\right) - \left[(1-\phi') \,.\, \epsilon' + \right. \\ \left. - \frac{x' \,.\, p_x}{Y' \,.\, p_y} \,.\, \frac{\Omega' \,.\, \pi' \,.\, \eta'}{(1+t')} \,.\right] . \frac{dt'}{(1+t')} \quad \ldots\ldots\ldots\ldots(\text{xvi})\end{aligned}$$

and

$$\begin{aligned}\frac{Y' \,.\, p_y}{X'' \,.\, p_x} \,.\, \frac{\pi''}{(1+t'')} \,.\, \frac{dY'}{Y'} + (1-\pi'') \,.\, \frac{dX''}{X''} = \left[-(1-\phi'') \,.\, \epsilon'' + \right. \\ \left. + \frac{y' \,.\, p_y}{X'' \,.\, p_x} \,.\, \frac{(1-\Omega')}{(1+t'')} \,.\, \pi'' \,.\, \eta' + \frac{y'' \,.\, p_y}{x'' \,.\, p_x} \,.\, \frac{\Omega'' \,.\, \pi'' \,.\, \eta''}{(1+t'')}\right] . \left(\frac{dp_x}{p_x} - \frac{dp_y}{p_y}\right) + \\ - \left[\frac{y' \,.\, p_y}{X'' \,.\, p_x} \,.\, \frac{(1-\Omega')}{(1+t'')} \,.\, \pi''\right] . \frac{dt'}{(1+t')} \ldots\ldots\ldots\ldots(\text{xvii})\end{aligned}$$

Instead of four terms representing the proportional changes in the four home market prices, we have now two terms only representing the proportional changes in the world market prices.

8. These are the first two equations of the system we have to solve. A third equation derives from the definition identity of the balance of trade

$$b=(Y'-y')\,.\,p_y-(X''-x'')\,.\,p_x\,.$$

By differentiation we have

$$\frac{db}{I'}=\frac{dp_y}{p_y}-R\,.\,\frac{dp_x}{p_x}+\frac{Y'}{(Y'-y')}\,.\,\frac{dY'}{Y'}-R.\,\frac{X''}{(X''-x'')}\,.\,\frac{dX''}{X''}+$$
$$-\frac{y'}{(Y'-y')}\,.\,\frac{dy'}{y'}+R\,.\,\frac{x''}{(X''-x'')}\,.\,\frac{dx''}{x''}$$

where I' is the value of imports in Country I and R is the ratio of the value of its exports to the value of imports. If we substitute world market prices for home market prices (see 7 above) and also (xi) and (xii), the equation becomes

$$\frac{db}{I'}-\frac{Y'}{(Y'-y')}\,.\,\frac{dY'}{Y'}+\frac{X''}{(X''-x'')}\,.\,R\,.\,\frac{dX''}{X''}=\frac{dp_y}{p_y}-R\,.\,\frac{dp_x}{p_x}+$$
$$-\left[\frac{y'}{(Y'-y')}\,.\,(1-\Omega')\,.\,\eta'+\frac{x''}{(X''-x'')}\,.\,R\,.\,(1-\Omega'')\,.\,\eta''\right]\,.\,\left(\frac{dp_x}{p_x}-\frac{dp_y}{p_y}\right)+$$
$$+\left[\frac{y'}{(Y'-y')}\,.\,(1-\Omega')\,.\,\eta'\right]\,.\,\frac{dt'}{(1+t')}\quad\ldots\ldots\ldots\ldots\text{(xviii)}$$

It represents the relation between proportional changes in the balance of trade (in proportion to the initial value of imports), in the world market prices, and in the quantities consumed.

9. We are now in the position to determine the relation between the change in the balance of trade, the proportional changes in the tariff and in the world market prices only. All we have to do is to regard (xvi), (xvii) and (xviii) as a system of three equations with three unknowns, $\frac{db}{I'}$, $\frac{dY'}{Y'}$ and $\frac{dX''}{X''}$, and to solve it with respect to $\frac{db}{I'}$. The solution is the formula given in the text.

10. The slope of the price reaction line may be determined in the following way. The condition that the money value of the total production is constant means that

$$x'\,.\,p'_x+y'\,.\,p'_y=Const.$$

We have by differentiation

$$(x'\,.\,dp'_x+y'\,.\,dp'_y)+(p'_x\,.\,dx'+p'_y\,.\,dy')=0.$$

We know, however, that in equilibrium relative prices must be equal to opportunity costs, i.e.,

$$-\frac{dy'}{dx'}=\frac{p'_x}{p'_y}.$$

This means that the expression in the second bracket must vanish. The first bracket gives us therefore the solution

$$\frac{dp'_y}{p'_y}:\frac{dp'_x}{p'_x}=-\frac{x'\,.\,p'_x}{y'\,.\,p'_y}=-\frac{(1-\Omega')}{\Omega'}\,.$$

The same argument may be applied to Country II.

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The Abolition of Derating: An Exercise in Differential Incidence

By ALAN WILLIAMS

The structure of local government in England and Wales is once more attracting a great deal of attention, and not the least of the problems urgently requiring solution is that of local government finance. Local authorities are at present dependent on the central government for over 40 per cent. of their revenue. In 1952–53, of total local government revenues amounting to £905m., £384m. was derived from central government grants of one kind or another, whereas income from rates was only £351m. (the remaining revenues being derived from rents, fees, trading activities, etc.). In order that this financial dependence upon the central government might be reduced, it has been suggested that the derating of agricultural, industrial, and freight transport hereditaments might be abolished.[1] It is not the purpose of this paper to argue the case for or against such abolition, but merely to provide a framework within which its major financial implications can be discussed clearly and dispassionately. To do so it will be necessary to consider the problem within the conceptual framework of differential incidence, i.e. it will be assumed that changes in the total income (or expenditure) of any sector of the economy are precisely offset by corresponding changes in its expenditure (or income). The nett position is always left the same as it was beforehand; it is the structure of each sector's accounts that changes. The analysis therefore refers to a situation in which the present " tax burden " has been placed on different shoulders—it has been redistributed between ratepayers in different authorities; between different classes of ratepayer within any particular authority; between ratepayers as a group and taxpayers in general, and between the various income strata of general taxpayers—without any change in the total " burden " to be borne by the community as a whole. Within this framework a quantitative estimate has been attempted, of the probable effects of the abolition of derating not only upon local authorities, but also upon the different classes of ratepayer, the central government, and the various income groups. As will become apparent, the evidence upon which some of these estimates are based is rather scanty, and in other cases what evidence there is is unreliable, so that not too much weight must be attached to them except as indicators of the probable direction of change.

Before turning to the statistical material, however, the mechanics of the Exchequer Equalisation Grant will first be described quite briefly.

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[1] This is not the only ground upon which the change has been advocated, of course.

It is a complicated grant, recalculated annually for each authority according to a formula whose variables are that authority's total rateable value, population, number of children, length of roads, costs of rate collection, losses and voids in rate revenue, and the national average rateable value per head of weighted population. In order that our calculations shall not become too cumbersome, however, voids, losses and costs of rate collection will be neglected entirely, as being minor orders of magnitude, and no more need be said of " weighted population " than that it is a device for making extra provision for authorities where there is a large number of children or a widely dispersed population. With these simplifications, the Exchequer Equalisation Grant may be regarded as the means by which the central government " pays the rates " on the amount of rateable value that would be necessary to bring the average per head of weighted population for each authority up to the national average. There is no levelling down for authorities whose rateable value per head is already above the national average.[1]

The most serious defect in the statistics is the absence of any reliable data concerning the present rateable value of agricultural hereditaments. They last appeared on the official returns in the year 1931, and the valuations then reported generally referred to the period 1925–30, and were not uniform. In the meantime, some agricultural land has been put to other use, while, on the other hand, some previously submarginal land has been brought under cultivation. The nett decline over the quarter-century is not likely to be greater than about 2 per cent., however, and will be ignored, since it is of small consequence beside the value changes that have taken place over this same period.[2] It has been estimated that freehold farm values have increased threefold over the period,[3] but since rateable values increase much more slowly than market values, it will be assumed that the rateable value of agricultural hereditaments would have been 25 per cent. greater in 1953–54 than it was in 1931.[4] This is very much guesswork, and the results obtained must be scaled upwards or downwards according to whether this estimate is considered to be too conservative or too radical. A further complication arises from the fact that however reasonable it may be to make these assumptions for agricultural hereditaments in general, it becomes very precarious when applied to each and every local authority. It might be argued that losses of agricultural land will be greater in or near urban authorities than elsewhere, or that changes in the value of farm properties are subject to wide regional variations. On the other hand, " green belts ", " overspills " and rural industrialisation tend to blur these simple distinctions between town and country, and only if the regional variations have changed disproportionately will our assumptions be rendered invalid. Lacking any clear basis upon which to discriminate, the 25 per cent. adjustment has been applied to all agricultural hereditaments as last reported. For the major urban authorities, the County Boroughs, the amounts involved are small in any case, so that the qualitative results would probably not be much affected by further refinements of treatment in this respect. Quantitatively, however, the estimates must be treated with great reserve.

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[1] For a more detailed treatment of the Grant formula see *Accounting Research*, Vol. II (1950–1), pp. 191–3.

[2] According to Table 1 of Part I of the Agricultural Statistics 1939–44 and 1950–51, the amount of land used for agricultural purposes in England and Wales declined from 30·4 million acres in 1935 to 29·9 million acres in 1951.

[3] M. Chisholm, " The Sale Value of Farms in England and Wales since the First World War ", *Westminster Bank Review*, February 1955, pp. 13–15.

[4] This is the same adjustment factor as that used in the report of the Society of County Treasurers to the County Councils Association, July 1954.

Industrial and Freight-Transport Hereditaments present no problems, since they are reported currently at 25 per cent. of their full rateable values.

Since voids, losses and costs incurred in rate collection have been ignored in calculating the amount of the Exchequer Equalisation Grant, they have also been ignored in the calculations of rate revenue, so as to maintain comparability. In our notional model, therefore, rate revenue is simply rateable value times rate poundage.

Bearing these reservations in mind, we may proceed to analyse the results obtained from the statistical estimates,[1] first of all from the point of view of the local authorities.[2] Each local authority is assumed to have the same total income from rates plus Exchequer Equalisation Grant as it had before,[3] but more of it will be drawn from the local rate payers and less from the Exchequer, the amount so transferred being about £17m., representing a decrease in the Exchequer Equalisation Grant of about 25 per cent., and an increase in rate revenue of about 4 per cent. Within these overall figures is concealed considerable divergence of individual experience, however. For example, the nett fall of £17m. in Exchequer Equalisation Grant is made up of an increase of about £3½m. in the amount going to County Boroughs[4] (from £12m. to £15½m.) and a fall of £20½m. (from £49½m. to £29m.) in the amount received by the Administrative Counties.[5] Fifty-five authorities become more dependent on grants, 63 less so, while 26 find their positions unchanged in this respect. But of the 55 authorities in the first group, 50 are County Boroughs; and of the 63 in the second, 51 are Administrative Counties. It is clear, therefore, that the abolition of derating, in making the administrative counties less dependent on Exchequer Equalisation Grants, makes the county boroughs more dependent upon them. This is because the national average rateable value per head of weighted population generally rises more than the rateable values per head of the urban authorities, which in turn is merely a reflection of the fact that derating removed £45m. (or nearly 30 per cent.) of the rateable value of the administrative counties, while for London and the County Boroughs the lost rateable value amounted to less than £14m. (or about 9 per cent. of the total). One effect of the abolition of derating is thus to make almost equal the proportion of county boroughs (24·1 per cent.) and administrative counties (24·6 per cent.) that are independent of Exchequer Equalisation Grants (compared with 32½ per cent. and 10 per cent. respectively at present).

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[1] The detailed tables are omitted here because of shortage of space, but copies may be obtained upon application to the author, c/o Department of Economics, The University, Exeter, Devon. There are four summary tables showing (i) the qualitative changes in the amounts of Exchequer Equalisation Grant received by the different types of authority, (ii) rateable values per head of weighted population by type of authority before and after the abolition of derating, (iii) rate poundages by type of authority before and after the abolition of derating, (iv) decreases in rate poundages consequent upon the abolition of derating; and also an appendix setting out the detailed calculations for each individual authority upon which the summary tables are based.

[2] The London County Council has been excluded from Tables I–IV because of its unique status. Details of the effects of the abolition of derating upon its finances will be found in the tables in the Appendix.

[3] i.e. in 1953–54, the latest figures available when these calculations were made.

[4] i.e. the major urban authorities outside the London Area.

[5] i.e. the rural and smaller urban authorities.

This equalising process is brought out still more strikingly by direct examination of the rateable values per head for the two types of authority. Here two conclusions emerge: (i) the general level of rateable values per head of weighted population for the administrative counties tends to move closer to that for the county boroughs; and (ii) the dispersion of rateable values per head for authorities within each class tends to diminish.

This twofold equalising process may be analysed further through the changes that will occur in rate poundages, through their being used as the adjusting factor by which the total revenue of each authority is kept constant. Rate poundages fall for all authorities, since there is some accretion of effective rateable value (i.e. actual rateable value plus rateable value credited) for each of them; nevertheless the average level of rate poundages for each type of authority approaches that of the other, while at the same time there is a greater concentration of rate poundages about the mean in each case.

If we turn now to the ratepayer, the immediate impact of the changes that have been discussed is via reduced rate poundages, which tend to redistribute the rate burden between ratepayers in different authorities. Most authorities will be enabled to reduce their rate poundages by between 4s. and 5s. To those paying rates on " Other Hereditaments " (Houses, Offices and Shops) this means a reduction of about £51m. in rates annually, with a similar £2m. reduction for the " Crown " as an ordinary ratepayer. For the now partially derated industrial and freight/transport hereditaments, the benefit of lower poundages is more than offset by the increased rateable value, the nett effect being to increase the liabilities of this class of ratepayer by some £34½m. Agricultural hereditaments become liable for approximately £35½m. in rates. There is thus an overall increase in rate revenue of about £17m. (just offset by the decreased Exchequer Equalisation Grant). Each of the above classes of ratepayer will be considered in turn.

Assuming that about two-thirds of " other hereditaments " are residential properties,[1] the rates upon which are paid by the occupiers, who are persons, then there will be an increase in their disposable incomes of about £34m. (compared with total disposable income of about £12,000m.) With some 13m. households in England and Wales, the benefit of lower rates averages about £2 10s. p.a. each.

The remaining £17m. of rate relief on " other hereditaments " would go mainly to occupiers of commercial properties—offices and shops—and is liable for income and profits taxes, so that about half of it will probably accrue to the Exchequer in this form. Assuming that the owners of these hereditaments are mainly the distributive trades, insurance, banking, and finance, the £9m. nett relief represents only about a 1 per cent. addition to their nett incomes. If passed on to the consumer, no noticeable lowering of prices can be expected, since the gross annual product of this sector of the economy is well over £2,000m.

Turning next to industry (including freight/transport), we find that the impact of the extra £34½ m. in rate payments is softened by the fact that this can be set off against income for income and profits tax purposes, thereby probably halving the nett amount to be found. Firms making low profits, or none at all, will be more hardly hit, of course, than these averages suggest, but in general the addition of £17m. to costs represents about 1½ per cent. of nett profits and ¼ per cent. of the gross product of manufacturing industry. Part of the increased rates may well be met out of the firms' existing resources, but in order not to minimise the possible extent of the readjustments caused by the abolition of derating, it will be assumed that it is all passed on to the consumer in the form of higher prices.

The extra £35½m. in rates required from agriculture can again be deducted from income for tax purposes, the remaining £18m. or so representing less than 2 per cent. of the annual gross value of agricultural produce, and about 5 per cent. of net incomes. The amounts involved here are thus relatively more important than those previously considered, and will therefore be examined more closely.

Food and agriculture subsidies (currently exceeding £300m. p.a.) are paid from the Exchequer at rates determined partly by the government alone, and partly by the government in consultation with agricultural interests at the annual farm price review. About two-thirds of the subsidies are paid directly to the farmers, mainly on account of the price guarantees for cereals, meat, milk and eggs, but also for specified technical operations and services. Since the guaranteed prices are pitched at a level that is intended to secure a reasonable profit on a typical farm, and rates will enter into the costs of that farm, we must expect the price level at which a reasonable profit can be earned on the typical farm to rise. In other words, short of a simultaneous change in agricultural price policy, the abolition of derating will mean either higher food prices or higher food subsidies, or both. If, for the sake of argument, we assume approximately a 50/50 split, then this involves an extra £9m. in taxation to pay for the increased subsidy, and a further £9m. in higher food prices, which represents a ¾ per cent. increase in consumers' expenditure on food; the whole of the increase in rate payments thereby being passed on in one way or another.

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[1] Thornhill, " Fixed Property Taxation and Local Government Revenue ", *Yorkshire Bulletin of Economic and Social Research*, March 1955, quotes an estimate of 59·5 per cent. of total rateable value for domestic property, upon which this estimate is based.

The " Crown " also pays contributions in lieu of rates on various properties used for official purposes, and will therefore enjoy some relief directly as a ratepayer. This relief will not, however, amount to much more than £2m.

Turning finally to the Exchequer, the estimated effects of all these changes are summarised below:

Adjustments to be offset by decreases in general taxation:	
Reduced Exchequer Equalisation Grant	17
Direct Rate Relief to " Crown "	2
Increased tax yields from owners of commercial hereditaments	8
(£ millions)	27

Adjustments to be offset by increases in general taxation:	
Lower tax yields from owners of Industrial/Freight/Transport ..	17½
Agricultural	17½
—hereditaments	
Higher subsidies to Agriculture..	9
(£ millions)	44

A nett increase in general taxation of some £17m. is therefore needed, which represents an increase of about ½ per cent. in central government revenues from all taxes.

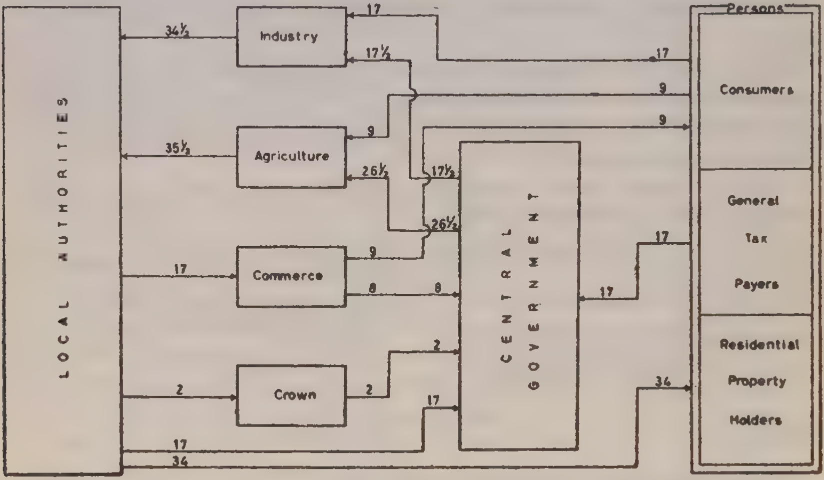
Before considering the effect of all these primary adjustments upon persons, it might be useful to draw together all our estimates in such a form that the basic " differential incidence " framework within which we have been working is clearly set out. On the diagram on the next page this is done, each sector being left with the same total income and expenditure by the changes we have assumed, the latter being shown by the arrows between the appropriate sectors.

The " general taxpayer ", the " consumer ", and the " residential property-holder " have been consolidated into one sector (persons) on the diagram, since they are regarded merely as different facets of the same entity.

The effects of the abolition of derating upon this composite sector will now be analysed in greater detail, with the object of estimating their impact upon its various income strata. For this purpose, " persons " will be divided into three groups, those whose incomes are (i) less than £500; (ii) £500 to £1,999; and (iii) £2,000 or over. Our assumptions about the division of taxes and expenditure between these groups are based (directly or indirectly) upon the estimates of Shirras and

Rostas,[1] Barna,[2] Weaver,[3] and Peacock and Browning.[4] No attempt has been made to apply further complex and refined adjustment to these estimates, since they are to be used upon what can at best be regarded as very rough orders of magnitude.

Commencing with the largest single item, the £34m. rate relief for occupiers of residential property, this will be divided between the three income groups in the proportions 63 per cent., 23 per cent., 14 per cent., i.e. £21½m., £7¾m., £4¾m., respectively.[5] The second largest item is the extra £17m. required of central government taxpayers.



Assuming that this were to be raised without changing the structure of the present tax system (at any rate, in so far as it affects the distribution of taxes between these three income groups), we may allocate this sum as follows—38 per cent., 25 per cent., 36 per cent., or £6½m., £4½m., £6m. The third item to be considered is the extra £17m. to be paid to industry for its products. This will be allocated proportionately to the aggregate disposable income of each group after paying direct taxes,[6] i.e. 47 per cent., 47 per cent., 6 per cent., or £8m., £8m., £1m. The reduction of £9m. in amounts payable to "commerce" is apportioned in the same way, viz., £4¼m., £4¼m., £½m. Finally, we have to allocate the extra £9m. to be found by consumers of agricultural produce, the basis here being the number of individuals in each group.[7]

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[1] *The Burden of British Taxation.*

[2] *Redistribution of Income through Public Finance*, 1937.

[3] "Taxation and Redistribution in the United Kingdom", *Review of Economics and Statistics*, August 1950, pp. 201–13.

[4] "The Social Services in Great Britain and the Redistribution of Incomes" in *Income Redistribution and Social Policy*, ed. Peacock.

[5] These proportions, and those used below for central government taxes, are the ones estimated by Peacock and Browning, *loc. cit.*, Appendix B.

[6] See *National Income and Expenditure 1946–53*, Table 18.

[7] See Appendix C to Peacock and Browning, *loc. cit.*

This gives a proportionate distribution of 81 per cent., 17½ per cent., 1½ per cent., or £7¼m., £1½m., £¼m. These estimates are brought together below:

	£0 to £499	£500 to £1,999	£2,000 and over
Lower rates on residential properties	+21½	+ 7¾	+ 4¾
Higher central government taxes	− 6½	− 4½	− 6
Higher prices for industrial products	− 8	− 8	− 1
Lower commercial charges ..	+ 4¼	+ 4¼	+ ½
Higher food prices	− 7¼	− 1½	− ¼
Totals (£ millions) ..	+ 4	− 2	− 2

The overall result is therefore effectively a redistribution of income in favour of the lowest income group—largely because rates on residential property are assumed to be regressive in incidence, so that the £34m. relief benefits the lowest group disproportionately, and this is only partially counteracted by the incidence of the other changes.

. . . .

To sum up, the abolition of derating would tend to equalise the rateable resources of local authorities, and if their total revenues were kept constant by lowering rate poundages, these would tend to be more equal also. There would be a fall in the amount of Exchequer Equalisation Grant disbursed, and increased rate payments from industry and agriculture, but lower rate payments from commercial enterprises and householders. Part of these changed rate burdens would be set off against the Exchequer, and we have assumed that the whole of the remainder is passed on to the consumer. The nett effect on " persons " of all these changes is a redistribution of income in favour of the lower income groups.

In conclusion, it must be emphasised once more that the data upon which these estimates are based are of varying reliability, so that the findings must be interpreted only as establishing the probable direction of change and a very rough estimate of its order of magnitude. Nevertheless, this paper will have achieved its purpose if it facilitates a fuller appreciation of the many ramifications of apparently quite straightforward adjustments in the field of public finance, and a greater awareness of the extent to which discussions, and indeed decisions, in this field rely upon conjecture about the " facts ".

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The Origins of the Synthetic Alkali Industry in Britain

By T. C. Barker, R. Dickinson and D. W. F. Hardie

Heavy chemical industry in its modern sense originated with the linking together of the manufacture of sulphuric acid and the synthesis of soda alkali from common salt. This integration did not come suddenly into being with the emergence of Nicolas Leblanc's classical process, but took place hesitantly alongside anciently established procedures for extracting alkali from the ashes of land and maritime plants. During the latter half of the eighteenth century, and particularly following the American War of Independence, alkali synthesis by various routes became increasingly important as an auxiliary source of an essential technological material.

The beginnings of heavy chemical industry inevitably depended upon developments in the manufacture of textiles, hard soap and glass, the three main consumers of alkali. As production in these industries gathered momentum, the natural sources of alkali—barilla, kelp and potash—gradually failed to keep pace with the demand put upon them. Any investigation of the origins of the synthetic alkali industry is, therefore, dependent upon quantitative considerations, in terms both of the consuming industries and of the natural alkali which was available. So far, however, no historians in this field have adopted such a line of approach.[1]

I

Previous attempts to explain the long interval between the publication in France of the Leblanc process[2] and its large-scale operation in Britain thirty years later have attributed the remarkable time-lag to the deterring effect of the salt duty.[3] But this explanation overlooks the drawbacks of duty which were usually granted upon raw materials used by a growing industry. In 1783, for instance, when the cotton and linen manufactures were beginning to expand rapidly, their development was further encouraged by drawbacks of the excise duties on soap and starch, and makers of sulphuric acid (used as a sour) were allowed a rebate of customs duty on sulphur and saltpetre.[1] At the end of the century, when chlorine came into use for bleaching, a drawback of duty was granted on common salt used in the manufacture of bleaching liquor or bleaching powder.[2] There is every indication that a similar repayment of duty would have been forthcoming had there been any serious attempt to use salt for making alkali. Indeed, in 1782 glass manufacturers were granted a rebate of duty on salt for the manufacture of ' mineral alkali ' used as a flux in glassmaking.[3] In 1798, Messrs. Losh and Co., who were about to set up as soda makers at Long Benton, near Newcastle, were allowed to use the brine from a nearby spring on payment of a mere twenty shillings per ton duty, one-twentieth of the usual rate.[4] Yet the firm never developed the manufacture of synthetic alkali on any scale before the end of the French wars.[5] Clearly, there are other explanations of the British tardiness in adopting the Leblanc process besides that of the salt duty.

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[1] C. T. Kingzett, *The History, Products and Processes of the Alkali Trade* (1877); George Lunge, *A Theoretical and Practical Treatise on the Manufacture of Sulphuric Acid and Alkali* (3 vols., 1879-80); J. Fenwick Allen, *Some Founders of the Chemical Industry* (Manchester, 1906); Stephen Miall, *A History of the British Chemical Industry* (1931); Archibald and Nan L. Clow, *The Chemical Revolution* (1952); T. I. Williams, *The Chemical Industry Past and Present* (1953); F. A. Henglein, "150 Jahre Sodaindustrie: Leblanc und Solvay", *Chemiker Zeitung* (1951), pp. 14-20.

[2] See below, p. 165.

[3] Kingzett, *op. cit.*, p. 72; Lunge, *op. cit.*, vol. II, p. 306; Fenwick Allen, *op. cit.*, p. 81.

If the repeal of the excise duty on salt has tended to mislead, the continuation of duties raised on two other commodities can help to elucidate. Soap and glass, two of the three main alkali users, were both excisable ; returns of the duty paid, therefore, provide records of the output of both industries.[6] The development of cotton manufacture can also be estimated from the figures of retained cotton imports.[7] The growth of the three industries may be seen from Table I.

It is evident that the increase in demand for soda arose almost entirely from the cotton textile and hard soap industries. The glass industry was of much less consequence, particularly as soapers' waste—soda previously used in the soapmakers' vats—sufficed for the manufacture of much of the bottle glass;[8] this branch constituted some two-thirds of the output by weight of non-flint glass.[9]

Knowing the output figures of the three main consuming industries, we can estimate the amounts of soda (as 100 per cent. sodium carbonate) required by each of them. The cotton industry, wrote Baines, used 64 lb. of sodium carbonate to 2,100 lb. of unbleached cloth,[10] or about 3 per cent. of the weight of the raw cotton used in the manufacture. The amount of soda required for hard soap is about 12 per cent. of the

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[1] 23 Geo. III cap. 77.

[2] 38 Geo. III cap. 89.

[3] 22 Geo. III cap. 39.

[4] 38 Geo. III cap. 89.

[5] Report from the Select Committee on the Laws Relating to the Salt Duties, 1818 [393] V. Evidence of Thomas William Carr, p. 24, of Samuel Parkes, p. 58, and appendix 17.

[6] Seventeenth Report of the Commissioners of Inquiry into the Excise Establishment (Soap), 1836 [20] XXVI, p. 10; Returns of the Quantities of Glass Exported and Retained for Home Use, 1839 [419] XLVI.

[7] G. R. Porter, *Progress of the Nation* (1847), p. 179.

[8] Samuel Parkes, *Chemical Essays* (5 vols., 1815), vol. III, pp. 447-9; Dionysius Lardner (ed.), *The Cabinet Cyclopædia* (1832) *sub* glass, p. 187.

[9] Returns of . . . Glass 1839 [419] XLVI.

[10] Edward Baines, *History of the Cotton Manufacture in Great Britain* (1835), p. 251.

TABLE I

PRODUCTION INDICES OF THE ALKALI-CONSUMING INDUSTRIES

(1815=100)

Year	*Cotton*	*Hard Soap*	*Non-Flint Glass*
1815	100(a)	100(b)	100(c)
1816	94	99	131
1817	126	102	142
1818	175	98	112
1819	144	102	129
1820	164	106	122
1821	148	115	92
1822	154	119	87
1823	201	125	97
1824	152	129	108
1825	218	132	120
1826	176	124	129
1827	270	134	129
1828	226	139	130
1829	220	133	134
1830	291	151	117
1831	294	140	101
1832	280	154	94
1833	316	178	96
1834	333	186	107

(a) The retained imports of cotton in 1815 amounted to 41,300 tons.
(b) The production of hard soap in 1815 was 34,720 tons.
(c) The production of non-flint glass in 1815 was 22,560 tons.

TABLE II

ALKALI REQUIREMENTS OF THE COTTON, HARD SOAP AND GLASS INDUSTRIES EXPRESSED AS TONS OF 100% SODIUM CARBONATE

(Each unit=1,000 tons)

Year	*Cotton*	*Hard Soap*	*Glass*	*Total 100% Sodium Carbonate required*
1814	·72	3·86	4·34	8·92
1815	1·34	4·16	4·51	10·01
1816	1·16	4·12	5·93	11·21
1817	1·69	4·26	6·42	12·37
1818	2·34	4·07	5·05	11·46
1819	1·93	4·27	5·83	12·03
1820	2·20	4·40	5·50	12·10
1821	1·99	4·78	4·17	10·94
1822	2·06	4·96	3·94	10·96
1823	2·70	5·21	4·38	12·29
1824	2·04	5·36	4·90	12·30
1825	2·92	5·50	5·44	13·86
1826	2·36	5·16	5·85	13·37
1827	3·62	5·60	5·82	15·04
1828	3·03	5·80	5·85	14·68
1829	2·95	5·52	6·03	14·50
1830	3·90	6·29	5·26	15·45
1831	3·94	5·83	4·57	14·34
1832	3·76	6·40	4·24	14·40
1833	4·24	7·40	4·36	16·00
1834	4·46	7·73	4·81	17·00

output tonnage,[1] and for glass 15-20 per cent.[2] Applying these percentages to the figures set out in Table I, the demand for effective soda grew as shown in Table II.

It now remains to consider to what extent the supplies of natural soda could be increased to meet this growing demand.

Of the two soda alkalis, barilla and kelp, the former was obtained by burning certain plants of the goosefoot family, which were cultivated for the purpose in the salt marshes on the coast of Spain and other parts of the Mediterranean littoral, as well as around the Canary Islands. It was a very impure product, usually containing only between 30 per cent. and 35 per cent. by weight of sodium carbonate. Customs duty was paid on its importation into Britain and the amounts coming into the country are therefore known.[3]

Kelp, the product of burning dried seaweeds, kept busy an increasing number of workmen in Western Scotland and Ireland. The soda content ranged between a mere 5 per cent. and 10 per cent., but it was able to compete with the richer barilla because, as a native product, it paid no duty. This also means that no customs figures are available, but by a fortunate chance a series of returns covering the years 1818-1825, the vital period so far as this article is concerned, was published in a parliamentary paper.[4] The amounts of barilla and kelp available for use and their 100 per cent. sodium carbonate content are shown in Table III.

By comparing the soda requirements (Table II) with the supplies available from kelp and barilla (Table III), it will be seen that long before 1823, the year in which (as is generally agreed) the Leblanc process was introduced into Britain on a substantial scale, supplies of soda from natural sources were being substantially augmented. Before attempting to trace whence these additional supplies came, it is necessary to investigate the growth of potash manufacture and to consider the effect of war upon the price of natural soda.

II

Potash (potassium carbonate) was derived from wood ashes. The process of manufacture was extremely wasteful of natural resources,

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[1] According to Seventeenth Report of the Commissioners, etc., 1836 (see Footnote 6, p. 159) 13·75 cwts. tallow were required to make 1 ton British hard soap. If this tallow is taken as glyceryl tristearate, then it can be shown on the basis of the quantitative chemical laws that a minimum of 2·44 cwts. of 100 per cent. sodium carbonate will be required for the saponification, i.e. approximately 12 per cent. of the weight of the finished ton of soap.

[2] Lardner (ed.), *op. cit.*; Parkes, *op. cit.*, vol. III, pp. 425-6, 457-60; Apsley Pellatt, *Curiosities of Glass Making* (1849), p. 33; Henry Chance, ' On the Manufacture of Plate, Crown and Sheet Glass ', *The Resources, Products and Industrial History of Birmingham and the Midland Hardware District* (ed. Samuel Timmins) (1866), p. 150. Recipes given by these several authorities all indicate effective alkali (100 per cent. sodium carbonate) contents within the 15 to 20 per cent. range.

[3] P.R.O. Customs 5 and Parliamentary Return, 1839 [261], XLVI.

[4] Account of the Quantity of Kelp Imported, 1829 [79] XVII.

TABLE III

NATURAL ALKALI RETAINED FOR HOME CONSUMPTION

(Each unit=1,000 tons)

Year	BARILLA			KELP			POTASH AND PEARL ASH		TOTAL NATURAL ALKALI IMPORTED AS WEIGHT OF 100% SODIUM CARBONATE	
	Gross Weight	Equivalent weight of 100% sodium carbonate if content is		Gross Weight	Equivalent weight of 100% sodium carbonate if content is		Gross Weight	Equivalent weight of 100% sodium carbonate (f)	Minimum (d)	Maximum (e)
		30%	35%		5%	10%				
1814	6·41	1·92	2·24	(a)			2·60	1·56	4·03	4·90
1815	3·75	1·12	1·31				6·42	3·85	5·52	6·26
1816	11·07	3·32	3·87				7·51	4·50	8·37	9·47
1817	10·36	3·11	3·63				9·59	5·75	9·41	10·48
1818	7·06	2·12	2·47	11·37	0·57	1·14	8·20	4·92	7·61	8·53
1819	8·09	2·43	2·83	10·34	0·52	1·04	8·75	5·24	8·19	9·11
1820	9·47	2·84	3·31	11·67	0·58	1·16	7·24	4·35	7·77	8·82
1821	10·28	3·08	3·60	11·93	0·60	1·20	8·48	5·09	8·77	9·89
1822	8·80	2·64	3·08	10·33	0·52	1·04	7·53	4·52	7·68	8·64
1823	18·54	5·56	6·49	9·05	0·45	0·90	14·11	8·47	14·48	15·86
1824	6·44	1·93	2·25	12·70	0·63	1·26	13·12	7·87	10·43	11·38
1825	6·06	1·82	2·12	10·15	0·51	1·02	11·86	7·12	9·45	10·26
1826	7·54	2·26	2·64				10·17	6·10	8·91	9·84
1827	14·48	4·34	5·07				6·29	3·77	8·66	9·94
1828	6·55	1·96	2·29	(b)			7·20	4·32	6·55	7·16
1829	5·16	1·55	1·80				7·45	4·47	6·02	6·27
1830	13·84	4·15	4·84	(c)			10·79	6·47	10·62	11·31
1831	12·62	3·79	4·42				9·60	5·76	9·55	10·18
1832	13·74	4·12	4·81				9·24	5·55	9·67	10·36
1833	10·97	3·29	3·84				8·32	4·50	7·79	8·34
1834	9·02	2·71	3·16				4·49	2·69	5·40	5·85

(a) For the years 1814–17 and 1826–7 kelp imports have been assumed to have averaged those of the years 1818–25, the only years for which figures are available.

(b) For the years 1828–9 it has been assumed that kelp imports averaged half of those for the period 1818–25.

(c) Kelp imports for 1830 onwards have been assumed to have been negligible.

(d) The minima are calculated on the assumption that barilla had a 30% and kelp a 5% sodium carbonate content.

(e) The maxima are calculated on the assumption that barilla had a 35% and kelp a 10% sodium carbonate content.

(f) The imported potash and pearl ash are assumed to have an average potassium carbonate content of 80%; this is approximately equivalent to a *sodium* carbonate content of 60%.

the ratio of potash produced to wood consumed being of the order of 1 to 500.[1] Moreover, the product contained impurities which reduced its actual potash content to about 80 per cent. A refined grade, produced by ignition of crude potash in a reverberatory furnace, was marketed under the name of pearl ash; this contained up to 95 per cent. potassium carbonate.[2]

By the eighteenth century Britain's resources of wood were such that little could be spared for potash manufacture at home[3] and the needs of the growing textile industry—requiring potash directly as an alkaline scour and indirectly as a constituent in the manufacture of *soft* soap—had to be met by imports from abroad. In the middle of the eighteenth century, some 800 tons came in from Russia, 500 tons from the East Country (Riga, Danzig, etc.) and about 120 tons from the kingdom of Naples.[4] The textile needs of other European countries were also increasing and the price of potash rose ; a British soapmaker, giving evidence in 1751, thought it had increased by 50 per cent. within ten years.[5] His representation formed part of a concerted campaign which caused Parliament to remove all import duties upon colonial potash,[6] and this, together with the rising demand, led to a growing export trade from North America. By 1770 more than 1,000 tons of potash and 700 tons of pearl ash were sent to Britain from the American Colonies.[7] During the War of Independence, when imports of colonial potash were drastically curtailed, the customs duty on imports from Europe was reduced to 2/- per cwt.[8] Although this reduction was continued when the war was over,[9] it did not prevent the potash makers of North America from gaining by far the larger share of the British market. This may be seen from the few surviving customs returns which relate to the period :

POTASH AND PEARL ASH (NOT DIFFERENTIATED)
IMPORTED INTO GREAT BRITAIN
(Tons)[10]

	1792	1800	1806	1807	1811
From Europe	1,008	1,524	1,815	1,802	2,332
From N. America	5,428	7,504	6,245	5,447	6,595

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[1] C. J. S. Warrington and R. V. V. Nicholls, *A History of Chemistry in Canada* (The Chemical Institute of Canada, 1949), p. 79; M. J. A. Chaptal, *Chemistry Applied to Arts and Manufactures* (4 vols., 1807), vol. II, p. 82.

[2] Analyses by Tatlock and others cited in *Chemistry, Theoretical, Practical and Analytical as applied to the Arts and Manufactures* (8 vols., 1880), vol. VII, p. 677.

[3] In 1749 the monopoly of pearl ash manufacture was granted to the proprietor of a factory at Bury St. Edmunds. Petition of William Lodge, *Journals of the House of Commons*, vol. 26, p. 241, 8 June, 1751.

[4] Evidence of William Jones, soapmaker, *Journals of the House of Commons*, vol. 26, p. 240, 20 May, 1751.

[5] Evidence of Cadwallader Coker, soapmaker, *ibid.*

[6] 24 Geo. II, cap. 51.

[7] Timothy Pitkin, *A Statistical View of the Commerce of the United States of America* (2nd ed., New York, 1817), p. 49.

[8] 20 Geo. III, cap. 25.

[9] 23 Geo. III, cap. 6, 26 Geo. III, cap. 53.

[10] P.R.O., Customs 5/1A-E.

The significance of these relatively large shipments of alkali from across the Atlantic becomes even more marked if they are set against the imports of barilla for these years :

BARILLA IMPORTED INTO GREAT BRITAIN (tons)

1792	1800	1806	1807	1811
5,368	8,781	5,139	5,966	Records destroyed

The extension of the field of hostilities to Russia and to the United States in 1812 reduced potash imports considerably ; supplies from Europe fell to 566 tons in that year and those from America to 3,874 tons. Two years later American imports stood at only 1,000 tons; but by that time larger deliveries were available from Europe and in 1815 the trade had almost recovered as may be seen from the figures in Table III.[1]

No doubt some of this imported potash found its way into gunpowder factories but most of it was available for use as an alkali. It was potash which narrowed the gap between the demand for soda and the supplies available from barilla and kelp. In the textile industry potash could be used directly as an alkali, but for the manufacture of hard soap and for glassmaking it had to be converted to soda alkali by processes which will be outlined later.

War inevitably distorted the pattern of supply of the natural alkalis, caused their prices to rise, and encouraged inventors to contemplate new methods of producing soda. Dr. Padley has shown that this was the case in this country during the American War of Independence.[2] It was also true of the Revolutionary and Napoleonic Wars, which led both Britain and France to seek alternative sources of supply. The two countries were forced to adopt wholly different expedients. Britain exercised command of the seas and was able to maintain access to the potash output of North America to supplement her varying soda resources, either by simple substitution of the potassium for the sodium alkali, or by chemical conversion of the imported commodity ; on the other hand, France's supply routes of natural alkali were much more vulnerable, and the tempo of the change-over to alkali synthesis in that country was accelerated by the external circumstances of war.

III

In 1776 the French Académie des Sciences, hoping to lessen the Marseilles soap industry's dependence upon Spanish barilla,[3] offered a substantial prize for a successful method of producing soda from common salt. This gave rise to proposals for a number of processes, among which was that of Nicolas Leblanc, then surgeon to the Duc d'Orléans.[1] In September, 1791, Leblanc was granted a patent for fifteen years after a thorough investigation, in the course of which it was emphasised that the process would effect a considerable saving in imports of natural soda.[2] The benefits accruing to Leblanc from this patent, however, were soon extinguished by the course of the Revolution. The factory just outside Paris, which was built to work his new process, had been financed by Leblanc's patron, Orléans. In April, 1793, Orléans was imprisoned, and in the following November guillotined. The Duc's property, including the Leblanc factory, was sequestrated and, in February, 1794, the Committee of Public Safety suspended the patent and ordered an enquiry into the various methods then in use for extracting soda from common salt. The report of the three Commissioners, published four months later, gave full details of all the processes, including Leblanc's, which had previously been a closely guarded secret. Lengthy extracts from this report were later published in the *Journal des Mines* and *Annales de Chimie*.[3]

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[1] P.R.O., Customs 5/2-4.

[2] Richard Padley, " The Beginnings of the British Alkali Industry ", *University of Birmingham Historical Journal*, vol. III, No. 1 (1951), pp. 64-78.

[3] Paul Baud, *L'Industrie Chimique en France : Étude Historique et Géographique* (Paris, 1932), p. 256. For France's reliance upon imported soda and his own efforts to cultivate soda-yielding plants in Frontignan, see Chaptal, *op. cit.*, vol. II, pp. 112-4. For the importance of Spanish barilla to the Marseilles soap industry, *Conférence sur le Savon de Marseille et son Procédé de Fabrication* (Marseilles, 1878), pp. 7-8.

Leblanc's process was singled out for special commendation by the Commissioners because the raw materials required were indigenous and widely available. It comprised two stages. The first, the conversion of common salt to saltcake (sodium sulphate) by means of sulphuric acid, was already in general use for the manufacture of Glauber's salt. The second stage consisted in furnacing an intimate mixture of one part by weight each of the sodium sulphate and chalk (calcium carbonate) with half a part of coal. Full details of the plant which Leblanc used are given in the Commissioners' Report; indeed, more help could hardly have been given to any intending manufacturer. Yet there is no evidence that it was used on any large scale in France for more than ten years after the appearance of the Report in 1794. The Commissioners then described Leblanc's factory as '*cet atelier naissant*'.[4] When it was restored to the inventor in 1801, he was unable to develop it into a profitable concern, and his career ended with his suicide in 1806. His biographer makes much of the lack of capital; but this may only indicate that there was not as yet sufficient general demand for synthetic soda to justify investment. It was not until after the war spread to the Iberian peninsula in 1808, however, and disturbed the flow of Spanish barilla that a shortage of natural alkali was created in France. Only then did the manufacture of the synthetic product become really attractive to the investor. Large-scale manufacture of Leblanc soda began at Marseilles, the home of the French soap industry, in 1808.[1] By 1810, nearly 1,000 tons per annum were being produced and by 1814, 3,500 tons. The new industry, having grown up under the protection of war, continued to flourish after peace was signed. In 1820 production at Marseilles reached 9,000 tons and the *Annales*, commenting upon the exhibition of French industry of 1819, emphasised the striking development that had occurred in this branch since the previous Paris Exhibition of 1806.[2]

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[1] The most authoritative account of Nicolas Leblanc is the biography written by his son-in-law, Aug. Anastasi, *Nicolas Leblanc sa Vie ses Travaux et l'Histoire de la Soude Artificielle* (Paris, 1884). See also T. S. Patterson, " Nicolas Leblanc and the Founding of the Soda Industry ", *Chemistry and Industry*, vol. 62 (1943), pp. 174-7.

[2] Anastasi, *op. cit.*, pp. 20-1.

[3] *Journal des Mines*, vol. III (1795), pp. 29-90; *Annales de Chimie*, vol. XIX (1797), pp. 58-156. Publication of the latter had been interrupted for three years.

[4] *Annales de Chimie*, vol. XIX, p. 61.

IV

Unlike France, Britain, thanks to her transatlantic connection, suffered no severe shortage of the two natural alkalis taken together ; but there was a rapid increase in the demand for the soda alkali, and, as its price rose, there was every inducement to use potash as a substitute wherever possible. The textile bleacher could turn directly to potash as an alternative, but the manufacturers of hard soap and of glass were dependent on soda. It was therefore necessary to devise methods either of transforming potash into soda, or of making soda in some other way.

The number of alkali process patents taken out from the time of the American War of Independence onwards shows that there was considerable inventive activity in this field. Few of the patents, however, are of interest to the economic historian, since they had little or no practical issue. What is of real significance is that usually those processes which were used were employed as subsidiary operations in particular works where soap and glass were manufactured, rather than on a larger scale in independent soda factories. James Keir, for example, whose process consisted in the slow, cold and incomplete reaction of a solution of sodium sulphate with slaked lime, used the caustic soda he thus produced to make soap and did not sell alkali to outside customers.[3] From the fact that by 1800 his concern was paying soap duty at the rate of £10,000 per annum,[4] it may be calculated that Keir was making the equivalent of some 50 tons of 100 per cent. sodium carbonate a year.

Soapmakers who required to supplement their soda alkali supplies, usually, however, employed double decomposition, common salt and potassium carbonate being reacted together in solution to yield potassium chloride and sodium carbonate. The salt could be obtained from lyes made with kelp which had a high salt content, and although this outlet was limited, the alum industry paid a good price for the by-product potassium chloride.[1] The glass manufacturer, too, made the most of this small market for the same by-product. When, in 1780, James King, a South Shields glassmaker, was granted a patent for making ' the newly-invented British barilla ' by reaction of salt with a wide variety of vegetable ashes, he specified that the alum makers, as well as the manufacturers of glass and soap, would benefit from his process.[2] In the following year he wrote that soda was being made by his method in several Tyneside glassworks in which he was concerned.[3] Thirty years later, the large plate glassworks at Ravenhead, near St. Helens—the only factory of its type in this country—was making its soda requirement by a similar process, and Lord Dundas, one of the proprietors who also had alum interests, had the refusal of all the potassium chloride produced as a by-product.[4] The considerable importance of potash by this time is clear from a list of ' fritterie materials ' used at Ravenhead in 1810. Their total cost amounted to some £8,800 and of this pearl ashes accounted for £5,800.[5] This represented a complete change-over to a new procedure, for in the middle of the 1790s the company had proudly displayed on the title page of its price list the goosefoot plant, the saltwort from the ashes of which barilla was derived.[6]

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[1] Louis Chabaud, *Marseille et ses Industries* (Marseilles, 1880), p. 128. The following production figures are derived from this source.

[2] *Annales de Chimie et de Physique*, vol. XIII (1820), p. 82.

[3] Padley, *loc. cit.*, p. 76.

[4] *Ibid.*

The processes employed by the Ravenhead company owed something to the researches of Archibald Cochrane, ninth Earl of Dundonald. In 1812, £100 was voted to Dundonald in the manager's name ' in consideration of the benefits he formerly derived from his Lordship's improvements in Chemistry '.[7] Dundonald, who had considerably eased his financial difficulties by his industrial activities, patented in 1781 a method of making coal tar and formed a company to exploit it.[8] Later, he turned his attention to the urgent problem of making soda from salt. He realised the importance of large-scale manufacture instead of production as a small subsidiary operation. In his book, *A Treatise Showing The Intimate Connection that Subsists Between Agriculture and Chemistry*, he regretted that ' one [method] only has as yet been discovered and effected at the expense which can admit a manufactory of alkaline salts being established on an extensive scale. The accomplishment of this most desirable object, by a cheap and easy process, must appear . . . to be one of the most important discoveries to which chemistry could have lent its aid '.[1] When these lines appeared in 1795, Dundonald was conducting research upon the subject at Bell's Close, Scotswood-on-Tyne, where he had just floated a company for the manufacture of soda along with Lord Dundas and, *inter alios*, John and William Losh.[2] The Loshes were members of a family whose estate was situated near Carlisle and who had already been drawn into the industrialisation of Tyneside.[3] William Losh (born in 1770) had studied chemistry under the great Lavoisier in Paris, and was in the French capital in 1791 at the time of the Flight to Varennes.[4]

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[1] Samuel Parkes, " An Essay on the Comparative Value of Kelp and Barilla ", *Transactions of the Highland Society of Scotland*, vol. V (1820), p. 110. In the second edition of his *Dictionary of Chemistry*, published in 1824, Andrew Ure notes that " When the price of American potash is such as to admit of economical employment, a ley of that alkali, rendered caustic by lime, is used in saponification, and the soft potash soap which results is converted into hard soap by double decomposition. This is effected either by the addition of salt, or rather of a kelp ley . . . " (Article on Soap.)

[2] British Patent 1246 of 1780.

[3] James King to Sir John Delaval, 7 April, 1781, cited in R. A. Foster, " The Industrial Development of the Seaton Sluice Hinterland in the Late Eighteenth Century " (MS. at Newcastle Reference Library, 1948), p. 28.

[4] Minutes of the British Plate Glass Co., 11 February, 1808 (Pilkington Brothers Ltd.).

[5] Account Book of the British Plate Glass Co., 1802-15.

[6] *Tariff of the Process of Polished Plates of Glass* (1794); Parkes, *op. cit.*, vol. III, p. 456.

[7] Minutes of the British Plate Glass Co., 27 May, 1812.

[8] Clow, *op. cit.*, pp. 396-7.

Dundonald took out a patent for the manufacture of Glauber's salt (sodium sulphate) in 1794,[5] and in the following year another for making caustic soda by the decomposition of Glauber's salt with potash.[6] (In the course of this latter patent specification, the process of making soda by interaction of pearl ash and salt was described as 'well known'; this, no doubt, was the 'one method' to which Dundonald referred in the passage just quoted). In April, 1797, a Newcastle paper advertised :

> 'Alkaline Salts, Chrystals of Mineral Alkali or Soda, Dried Chrystals of Alkali, Barilla Salts, Chrystals of Dried Pot Ash, Pearl Ashes of the usual strength, as are now preparing in large quantities at the Works established near Newcastle, from whence . . . glass manufacturers, Soap-Makers and Bleachers may be supplied with the article which suits their purposes . . . '[7]

By that time Dundonald had gone on to patent a method of decomposing salt by means of litharge[8] (lead mining being long established in the Tyneside hinterland), but this process, based on oxidation of salt with lead oxide, did not oust that using potash. The by-product chloride of lead, used as a pigment, was no more valuable than the by-product chloride of potash, used by the alum makers. During the early years of the nineteenth century, therefore, when the Dundonald-Losh firm (by then removed to Walker-on-Tyne) had the advantage of salt from a nearby spring, on which salt almost total remission of excise duty was granted,[1] it concentrated upon the salt-potash double decomposition process.[2]

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[1] Quoted *ibid.*, pp. 101-2.

[2] Thomas Richardson, J. C. Stevenson and R. C. Clapham, " On the Chemical Manufactures of the Northern Districts ", *Report of the 33rd Meeting of the British Association held at Newcastle-upon-Tyne in August and September, 1863* (1864), p. 702.

[3] Henry Lonsdale, *The Worthies of Cumberland* (6 vols., 1867-75), vol. IV, pp. 151, 156-9. The diaries of James Losh, at the Public Library, Carlisle, contain references in 1796 and 1797 to his visits to the alkali manufactory at " Bellclose " and to Lord Dundonald.

[4] I. Lowthian Bell, " On the Tyne as Connected with the History of Engineering ", *Proceedings of the Institution of Mechanical Engineers* (1881), p. 445. The writer had this information from William Losh himself.

[5] British Patent 2015 of 1794.

[6] British Patent 2043 of 1795.

[7] *Newcastle Advertiser*, 22 April, 1797, quoted in Francis Buckley, " Glasshouses on the Tyne in the Eighteenth Century ", *Journal of the Society of Glass Technology*, vol. X (1926), p. 50.

[8] British Patent 2189 of 1797.

But the market for soda was not growing at the same pace on the Tyne as on the Mersey. As has been shown, it was the soap and textile industries which were expanding most rapidly. Lancashire was the main site of the rising cotton industry, and the Merseyside soap industry, which was in its infancy in the 1770s, soon far outstripped that of Tyneside and by the end of the Napoleonic War was approaching the output of London, the traditional centre of soapmaking in England.

It was the rising soap industry at Liverpool which first used Leblanc soda and provided the manufacturing chemist with the large-scale market which was essential to the profitable operation of the new process. Although soapmaking on the Mersey was described in the 1790s merely as ' an Encreasing Trade not of many years' standing ',[3] by 1820 the Liverpool area was making twice the output of soft, and two-thirds the output of hard, soap produced in London.[4] For natural soda alkali the Liverpool soapmakers employed mainly kelp and the Londoners barilla. In 1822, however, the London boilers gained a certain advantage by the halving of the barilla duties.[5] This caused alarm in Liverpool, and the soapmakers there drew up a sharply worded memorial of protest in which they claimed that the tax change would be ' to the profit only of the London Soap Manufacturers and of Foreigners ', for they and ' nearly all the other Soap Boilers in the Kingdom, except in London, use kelp as an Alkali in the Manufacture of Soap ; but the London Soap Boilers, instead of Kelp, employ the foreign Article of Barilla for the sake of saving in Coal . . . '[6] To this memorial the Liverpool agents of the kelp proprietors added that kelp would be ' utterly superseded throughout the kingdom ' for soap boiling. The reduction in the barilla duty, they claimed, ' would have a much more injurious effect on the kelp trade than if salt were to be totally freed from taxation '.[7]

The time was ripe for the appearance of the resourceful industrialist who could provide the Merseyside soapboilers with a synthetic soda which would enable them to continue to increase their business, despite the advantage gained by their London competitors. Such a man was James Muspratt.

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[1] See above, p. 159.

[2] R. C. Clapham, " An Account of the Commencement of the Soda Manufacture on the Tyne ", *Transactions of the Newcastle-on-Tyne Chemical Society*, vol. I (1868-71), p. 341.

[3] Holt and Gregson MSS., vol. XXII, fo. 22 (Picton Reference Library, Liverpool).

[4] Accounts of the Duty Paid on Hard and Soft Soap, 1821 [73, 74, 345], XVII.

[5] *Journals of the House of Commons*, vol. 77, pp. 451, 479, 24 July, 5 August, 1822.

[6] Treasury and Excise Papers, vol. 101, fo. 323-4 (Library of H.M. Customs and Excise).

[7] *Ibid.*, fo. 326.

The main features of Muspratt's life have been outlined elsewhere[1] and need not detain us here. At the beginning of 1822 he had for some years been a partner in a small chemical concern in Dublin. It is possible that he may have experimented with the Leblanc process in Ireland.[2] In deciding to introduce the process on Merseyside, Muspratt was no pioneer so far as Britain was concerned, for soda had been made by that method by Tenants at Glasgow since 1818[3] and by Losh and Co. on the Tyne since 1819.[4] Muspratt's innovation was not in the process, but in the scale on which he operated it from the outset. In this he was undoubtedly assisted by a favourable economic climate. When he moved to Liverpool, the period of war finance was at last ending, rates of interest were falling, and more capital was becoming available for industrial expansion.

Instead of making the refined and stronger soda ash—the so-called ' white ash '—in small amounts, Muspratt manufactured during the first six or seven years of his activities the cruder, less concentrated and foul-smelling black ash. He was able to market this unpleasant and unstable product at a price which, after a certain initial sales resistance, caused the soapboilers gladly to abandon their use of both natural alkali and such small-scale double decomposition alkali-producing processes as could be carried out on their own premises. Once the new alkali was accepted, it enabled the Merseyside soap industry to overtake the output of London. This growing demand for Leblanc alkali soon called other chemical factories into existence. By 1830 Muspratt and possibly other alkali makers were turning to the manufacture of the stronger white ash, which could be transported easily and stored for any length of time without deterioration. This purer form of synthetic soda allowed palm oil to be used in soap production in place of the more expensive animal fats, and soon gained for Merseyside the greater share of the British export trade in soap, as well as a large portion of the sales at home, and this despite the fact that the soap industry elsewhere was starting to use Leblanc soda.[5] In 1835 a London soapboiler confessed: ' Liverpool is the great market now for the export of soap and there is the great consumption of palm oil and almost all the soap for exportation (certainly nineteen-twentieths) is made from palm oil exclusively '.[6]

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[1] J. Fenwick Allen, *op. cit.;* D. W. F. Hardie, " The Muspratts and the British Chemical Industry ", *Endeavour*, XIV, pp. 53, 29-33 (1955).

[2] This was explicitly stated in Muspratt's obituary notice in the *Liverpool Post*, 5 May, 1886. Kurtz, who went to Dublin in 1818 to conduct experiments, referred in his notebook to purchasing " soude de Muspratt ". J. Fenwick Allen, *op. cit.*, pp. 122-3, did not consider that this could have referred to the Dublin period but it may have done so.

[3] J. Mactear, *Report of the Alkali and Bleaching Powder Manufacture of the Glasgow District* (1876), p. 25.

[4] R. C. Clapham, *loc. cit.*, p. 38.

[5] Seventeenth Report of the Commissioners of Inquiry into the Excise Establishment (Soap), 1836 [20] XXVI, p. 98.

[6] *Ibid.*, p. 104.

From the middle of the 1790s onwards the successful launching of the new process depended upon the alkali maker's ability to sell his product in substantial quantities to the soapmakers, rather than upon detailed technical knowledge of the process itself, or the abolition of the salt duty. In France, the soapmakers were obliged to turn to the synthetic product as a result of war. In England, where no such external compulsion came into play, emergence of a synthetic alkali industry was delayed until a stage was reached at which the limited harvests of natural alkali could no longer meet the requirements of the expanding soap and textile industries, and, more particularly, double-decomposition processes, based on American or Continental potash, could no longer cope with the chronic *soda* shortage. The growth of large soapmaking enterprises on the Mersey in competition with the former traditional home of the industry on the Thames, the reduction of the barilla duty, the abolition of the salt tax and a propitious economic climate, were all factors which favoured James Muspratt and his immediate followers in the field of Leblanc alkali manufacture. And, given these favourable circumstances, much was due to Muspratt's own ingenuity and enterprise.

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A Letter from David Ricardo

By Lionel Robbins

On pages 19 and 20 of a pamphlet, published in 1829 by the Right Honourable Robert Wilmot Horton, M.P., and entitled *The Causes and Remedies of Pauperism in the United Kingdom Considered*[1], there occurs a footnote, reprinting a letter from David Ricardo which since its original publication seems to have remained completely unnoticed. I came upon it purely by accident when seeking information concerning Wilmot Horton's relations with Robert Torrens.

The footnote and the letter run as follows :—

" In 1822, I enclosed to the late Mr. Ricardo a copy of a proposition which I had printed, but not published, respecting the policy of mortgaging the Poor-rates, for the purpose of raising a fund for emigration ; and although my estimate was then far beyond what it is now necessary to take, it will be perceived from the following letter, that Mr. Ricardo was so convinced of the propriety of the proposition, as to feel himself justified in assenting to it under that larger estimate. I have the greater satisfaction in publishing this letter, as I think that its tone and manner do so much honour to his memory, when it is considered that it was written to a political opponent, who had only the advantage of a very slight acquaintance with him.

" Widcomb-house, Bath, 19th Jan., 1823.

" My dear Sir,

" My servant at Gatcomb-Park having neglected to send my letters after me, I did not receive your note, with the pamphlet accompanying it, till this morning.

" You know I am frequently reproached with being a theorist, and if those who so reproach me mean that I am not acquainted with the practical details of the subjects which have engaged my attention, they are right. The subject of the Poor-laws, for in-

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[1] The full title page is as follows : /The Causes and Remedies of Pauperism in the United Kingdom Considered: /Part I./ being A Defence of the Principles and Conduct of the Emigration Committee Against the Charges of Mr. Sadler./ By the Right Hon. R. Wilmot Horton, M.P., Late Chairman of that Committee./ London:/ John Murray, Albemarle Street./ MDCCCXXIX/. Another edition bearing the same title page, save for the words " Introductory Series " in place of " Part I " was published in 1830 by Edmund Lloyd, Harley Street.

There are four other tracts by this author bearing the same title or the same title enlarged into *An Inquiry into*, etc., labelled " First, Second, Third, and Fourth Series ", respectively, and published in 1830. The Fourth Series is notable as containing answers by Senior to a very lengthy questionnaire drawn up by the author entitled *General Principles Respecting the Poor*. Copies of all five pamphlets are bound together in a volume bearing the shelf number D.830 in the Goldsmiths' Library. Three of these, however, the first, second and third series, are second editions published in 1831. A volume containing first editions of the four numbered series but lacking the *Introductory Series* is also in the same collection.

> stance, is one intimately connected with the science of political economy ; but nobody is so little acquainted with them, as forming a part of parish economy, as I am. The question you refer to me relates wholly to parish economy, and, therefore, I am not qualified to give a good opinion on it.
>
> " I can have very little doubt but that the plan would be favourable to parishes. With the waste and extravagance of our system of Poor-laws, an able-bodied pauper must cost the parishes more than thirty-five pounds. It is said in the Outline ' that each able-bodied pauper costs a parish ten pounds per annum ' ; but against this must be set the value of the work which such pauper may be made to do for the parish, and also the general saving in the wages of labour which accompany the present system. If the farmer who pays ten pounds, saves five pounds in the wages of the rest of his workmen, his real contribution is only five pounds, and the real saving to the parish will be only a like sum. With every Emigrant we are to divest ourselves of thirty-five pounds capital. If employed at home, with that portion of capital, he could replace it with a profit, England would be a loser by the proposed plan. The enemies of the plan will say that he could do so ; and if they could make that appear, I would rather adopt their plan than the one recommended.
>
> " At the present moment, we are to compare the emigration plan to the system at present existing, and I can have no doubt that it would be attended with great advantages over it. The plan would be economical ; it would enable us to get rid of the most objectionable part of the Poor-laws, the relieving able-bodied men ; and what is to me by far the most important consideration, it would not fail to make the wages of labour more adequate to the support of the labourer and his family, besides giving him that as wages, which is now given to him as charity.
>
> " I told you how incompetent I was to say any thing worthy of your attention on this subject, and I have now convinced you of it.
>
> " Believe me, &c.
> (Signed) ' DAVID RICARDO '. "

Both the style and the date confirm the authenticity of the letter. It is difficult to imagine anything more characteristically Ricardian than the candour of the second paragraph ; Mr. Sraffa informs me that Ricardo was at Bath at the time it was written. It would come between Letters 516 and 517 of Mr. Sraffa's great edition.

Sir Robert John Wilmot Horton, to whom the letter was addressed, was in his day a person of some prominence. He was born in 1784, educated at Eton and Christchurch, and returned as Member for Newcastle-under-Lyme in June 1818, which constituency he represented until his retirement in 1830. In 1821 he was appointed Under-Secretary of State for War and the Colonies ; he was admitted to the Privy Council in 1827 ; and in 1828 he resigned office with others of the Huskisson party. From 1831 to 1837 he was Governor and Commander -in-Chief of Ceylon. He died in 1841. His wife, Anne Beatrice Horton, whose surname he added to his own patronymic of Wilmot, was the subject of Byron's lines " She walks in beauty, like the night ". In the history of literature, he himself is to be remembered as having been responsible, with Colonel Doyle, for the destruction of Byron's Memoirs after the famous meeting at Murray's. In politics he was an opponent of parliamentary reform, a supporter of Catholic Emancipation, and a very active exponent of the policy of emigration as a means of reducing pauperism (Charles Buller's " shovelling out paupers ") in which capacity he came into violent conflict with Gibbon Wakefield and the founders of the Colonization Society. He lectured at the Mechanics Institute but, according to Greville, was " full of zeal and animation, but so totally without method and arrangement that he is hardly intelligible ".[1]

I have not been able to discover any trace of the pamphlet " printed, but not published," upon which Ricardo was commenting.

London School of Economics.

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[1] See *The Dictionary of National Biography*, Vol. XXVII, pp. 90–91, for further information and an extensive list of his publications.

Book Reviews

The Economics of Location. By AUGUST LÖSCH. Yale University Press, New Haven. Oxford University Press. 1954. xxviii + 520 pp. 60s.

Two things must be borne in mind when reading Lösch's book on location. The first is that this is a pioneer book in the full sense of this word. So far the problems of location have always been somewhat attached to economics; they have never become an integral part of it. Germany is, in fact, the only country in which a theory of location has been developed at all, and Lösch's book is the first attempt to incorporate it into the general system of economics.

He had to build from scratch. In spite of many references in the footnotes, and all credit given to the predecessors, there was very little to start with. Nearly everything had to be invented: the main concepts, the tools of analysis, techniques of presentation and the methods of using them. The reader must therefore be prepared for something new. But he must also be prepared for its being difficult. Lösch's book does not make easy reading—perhaps even less easy than it might have been. He had been working on his *Economics of Location* for over ten years, and the technical apparatus he had been using became so familiar to him that he did not seem to understand that it might be difficult to other people. There are, therefore, instances of diagrams not adequately explained and of formal reasoning not always easy to follow.

The second thing that must be borne in mind is that the book was written nearly twenty years ago. August Lösch died in 1945. The first German edition of his book appeared just at the beginning of the last war. The second, revised, edition was published during the war as well. The present English translation is based on the second edition with a few paragraphs taken from the first. The reader must, therefore, realise that the economics into which Lösch tried to incorporate the elements of space and location is not of a very modern variety. Before the war he was directing research on location and international trade in the Institut für Weltwirtschaft at Kiel, and his economics is typical of those circles and those times.

The book consists of four parts. The first deals mainly with location of individual units of production. Industrial and agricultural location are discussed separately, each by means of a different technique. In the case of industrial location the technique used has already been developed by Lösch's predecessors, Palander and Alfred Weber. His theory of agricultural location is a development of v. Thünen's rings. The part ends with a system of equations determining an equilibrium pattern of location of n units producing m products. The form of presentation, with whole equations treated as unknowns, does not make the argument easy to follow, and the claim to generality does not seem to be justified. The system of conditions and of unknowns can easily be split into parts, each corresponding to one product only, because the pattern of location of units producing each product is determined by the given conditions of demand, of freight rates, etc., quite independently of the pattern of location of the units producing other products. The model is thus general only in the sense that it deals with a large number of products at the same time. But in fact it is partial because there is no interdependence either between individual markets or between the conditions of supply and the conditions of demand.

The second part of the book deals with economic regions. Suppose that demand is evenly distributed over a certain area. What will be the distribution in space of the production units and what will be the shape of the market of each unit ? It turns out that the pattern consistent with the largest possible number of independent units of production is that of a honeycomb, the market of each unit being in the form of a perfect hexagon. Such networks of markets, each network corresponding to a different product, are then superimposed one on another and form what Lösch calls the economic landscape. This has its ideal form as well. It looks like a wheel with twelve spokes. The metropolis is in the centre, and the twelve regions between the spokes are half of them of an urban character, with production of many goods concentrated in large towns, and half poor in towns, with only small agglomerations of industries. These two types of regions alternate one with another. With this pattern of production in space the greatest number of locations coincide, the greatest number of purchases can be made locally, and the transport costs are at a minimum.

The chapters on economic regions are the most interesting in the whole book. They are followed by Part III, in which an attempt is made to apply the ideas developed in the first two Parts to international trade. First we have a few comments on comparative costs and then an extensive discussion of the transfer problem. These are perhaps the least satisfactory parts of the book. The general line of the argument is that net payments from, let us say, Berlin to Paris tend to depress prices in Berlin and to raise them in Paris. This produces waves of price movements of a sort, running in the outward direction from Berlin and from Paris, respectively. The actual transfer in goods takes place when the waves meet at the frontier. The discussion ends with very general comments on trade barriers, migration, monetary policy, etc. In comparison with the modern books on international trade and payments, Lösch's treatment—with its lack of rigour and intuitive generalisations—is, to say the least, a little old-fashioned.

The last Part is an empirical study. It contains many interesting data about spatial distribution of industries, of prices, wages, interest rates, etc. Lösch does not regard them as an empirical verification of his theory. He is well aware of the existence of many non-economic factors affecting location, and treats his statistical studies merely as a check on how far reality agrees with economic rationality. None the less, the cases in which we find a very close correspondence between actual and theoretical patterns are very interesting.

The book as a whole deserves respect. It represents a heroic attack on an important but neglected field of study, and there is no doubt that it is a product of much work and of original thinking on a high level. A general economist may be discouraged by difficult presentation and unconventional techniques, but to all those who have chosen the problems of location as their special subject of study Lösch's book is essential reading.

S. A. Ozga.

An Expenditure Tax. By Nicholas Kaldor. George Allen & Unwin Ltd. 1955. 242 pp. 18s.

In the process of arguing for the replacement of the present surtax with a progressive tax on personal consumption expenditures Mr. Kaldor subjects the major problems involved in the taxation of people according to their economic means to a searching and imaginative analysis. Not since the classic works of Simons and Vickrey has this area of tax theory received such comprehensive and provocative treatment.

More than three-fourths of the book is devoted to the theoretical issues. Equity in taxation, Kaldor argues, requires a levy on persons, progressive in relation to their spending power. The present British income tax, he maintains, by excluding from its base capital gains and losses, gifts, bequests, and other gains, departs substantially from that ideal. An all-inclusive income tax, such as that advocated by Simons and Vickrey, comes closer to the ideal, but even it falls short because of the problems involved in converting money income into real terms when prices and interest rates fluctuate. Interest rate changes may be ignored in taxing expenditure, and, further, Kaldor contends (p. 43), " whether prices are rising or not, it may be assumed that equal expenditure in terms of money value in any given period represents claims of equal real value on goods and services." This is a rash assumption, but, even so, income is probably more difficult to convert into real terms than is expenditure. One's choice between the two taxes on equity grounds, therefore, will depend on one's expectations as to the possibility of price stability; given such stability, of course, income is the closer measure of spending power. Kaldor is clearly pessimistic in this regard.

Apart from the equity issue, Kaldor argues that an income tax is inferior to an expenditure tax in four important respects: (1) it discourages saving and risk-bearing and hence tends to retard economic growth, whereas an expenditure tax does not; (2) it has a greater tendency to weaken work incentives, although the difference between the two taxes here is not likely to be great; (3) it is a less efficient tax in the sense that, per pound of tax revenue raised, it lowers private spending less than does an expenditure tax; and (4) as an instrument of counter-cyclical fiscal policy it is less precise than expenditure taxes levied on consumption and investment. Of these arguments, the first and third are most likely to arouse criticism. It has been shown by Domar, Musgrave and Rolph, for example, that a true income tax which allows full loss offsets does not discourage risk-taking, since the rate of return per pound risked remains constant as the tax rate rises or falls. The efficiency argument will seem to many a considerable overestimation of the advantages of economising on tax revenues, which are not a scarce resource (economy in this respect is not equivalent to economy in the administration of the tax system), and a distinct underestimation of the economic disadvantages of large public deficits.

Even those who do not agree with Kaldor concerning the relative merits of income and expenditure taxation are likely to be impressed by the case he makes for some use of a tax on private spending. Consider, for example, its anti-inflationary powers as compared to those of the purchase tax and other excises which are not only immediately inflationary but may also bring about further inflation of the ' cost-push ' variety by strengthening the case for higher money wages.

In addition to the topics already noted Kaldor discusses the administrative feasibility of an expenditure tax (given sufficient public support such a tax should be practicable), the case for an annual tax on net wealth (a strong one), and the problem of how companies should be taxed in relation to partnerships and sole proprietorships (debatable). In the true Marshallian tradition, even the footnotes are immensely interesting.

This is a book, then, that should certainly be in the library of anyone interested in the economic problems involved in modern taxation. One word of warning, however—potential purchasers should not wait too long to buy. If the author's proposals are adopted the buyer will be faced not only with the purchase price but with an additional tax burden as well.

GEORGE F. BREAK.

Economic Theory and Method. By F. ZEUTHEN. Longmans, Green & Co. 1955. xii+364 pp. 30s. net.

The economist who decides to spend a sabbatical term catching up with the reading on economic theory, which an overburdened post-war decade has compelled him to neglect, will find in Professor Zeuthen an admirable Baedeker, discerning, urbane and exceedingly erudite.

To handle and glance through his book is to be immediately attracted by its air of a general richness. To start with, it is beautifully manufactured and hence a pleasure to hold in one's hand and to read; and these are qualities too seldom found in books on economics published in England. For some readers, at least, they constitute no negligible merit. Then a glance at the table of contents shows the headings of sixty-four chapters grouped in four Parts, some of these chapters being sub-divided into up to a dozen numbered sections. There are forty-six diagrams, beautifully drawn and printed, many of them of a high ingenuity and making a real and direct visual appeal. The generous measure, in which the various types of ingredients that make a textbook have been poured in, appears perhaps most significantly in the tremendous number of footnote references to the literature. This footnote apparatus is remarkable and (with no disrespect to Professor Zeuthen's admirable text) is one of the book's most valuable features. The footnotes not only direct one to an immense number of really up-to-date original sources, but often summarise their argument.

The book is in effect a compact encyclopædia of modern economic theory with a continental, as distinct from a Marshallian, approach. Where is the English textbook that makes a serious effort to show economics as part of men's total speculations about the nature of their life? Here, forty pages are devoted to explaining the nature of theoretical insight and how it may be sought. Many English teachers will advise their students to skip this, and their advice will be bad.

Part Two of the book begins with the best and clearest elementary statement I have yet come across of the Walrasian system. The only fault to be found with it is a perhaps too bald statement that determinacy is always and only achieved by equality in numbers of equations and unknowns. But it gives the heart of the matter very compellingly and draws with proper emphasis the moral of economic interdependence which ought very early to become ingrained in the conscience of every student. Part Three, on Dynamics, presents the whole gamut of orthodox ideas, perhaps in some cases rather too briefly for a full comprehension to be gained by the reader relying on this book alone; but this is scarcely avoidable, and the wealth of footnote references enables any idea to be thoroughly explored in the literature. It must be confessed that, certain architectonic Scandinavian ideas apart, this rapid conducted tour of the economic city leaves Dynamics looking like a collection of temporary huts clustered about the ruined glory of the static Acropolis. The traveller may reflect that time is not finished yet, and will perhaps have its revenge.

Part Four, on Forms of Market and Structure of Society, derives a special value and distinction from its dealing with the field where Professor Zeuthen's own work has made, perhaps, an even greater contribution than elsewhere.

The book bears everywhere the stamp of a mathematically trained mind without allowing mathematical apparatus to put in more than the most guarded and unobtrusive appearance. Many matters are explained which the ordinary economics textbook or course of lectures leaves the student to grope for unaided. Teachers of economics take far too much for granted. Professor Zeuthen's book, though assuming a highly intelligent reader with an untiring zest for condensed theory, takes very little for granted, and will provide the able second- and third- year student with invaluable guidance through the files of the journals.

G. L. S. SHACKLE.

A Geometry of International Trade. By J. E. MEADE. George Allen and Unwin Ltd. 1952. Pp. 112+50 diagrams. 28s.

Ingenuity amounting to genius, classicism of problem and method, austere intellectual drill, economy of statement seldom paralleled in economics, inhuman patience in devising the precise details of diagrammatic treatment, endless care for *minutiae*, the physical book a joy to handle and read; these are some of the phrases that shoot through a reviewer's mind as he lays down this astonishing manual.

It is a proof, if one were needed, that originality has little dependence on radical departures or the abandonment of earlier work. Here Professor Meade has taken those familiar geometrical or diagrammatic tools of the economist, the indifference curve, the production-opportunity curve, the price line, the offer curve, the contract curve, and shown how every question that can arise in the two-country, two-commodity model of international trade can be visually formulated and, in a sense, answered, with their aid. The kind of answer that such diagrams give may perhaps be called qualitative insight. We can see how various pressures or conditions bear upon each other, how the effects of a given act of policy make room for themselves by displacing the market situation in this direction or that, and whether each variable would increase or diminish if this or that curve were made less convex, or this or that price, tax or subsidy were altered.

This character of Professor Meade's " Geometry " makes it pre-eminently a second-year book. Students who have suddenly and recently got the " feel " of the geometrical technique, whose eye now goes instinctively to points of tangency or intersection, who no longer merely gaze at a diagram but concentrate professionally upon its vitals, these will delight in the splendid, challenging array of difficult looking, but in fact beautifully lucid, pictures. Never was there a greater contrast between the first-glance impression, of something so tough that fierce concentration and several perusals would be needed in order to follow it at all, and the reality of a book which is very nearly, incredibly nearly, " readable ". This fact by itself makes the book a triumph of didactic art.

So much for the author's wonderful resource and skill in exposition, and for the basic classicism of his method. His problem too is of course classic in every sense. Problems of the trade between nations, of its benefits, the ends which can be served and the means which can be used in regulating it, have occupied a large part of economists' time since the beginnings of political economy, and, of course, still do so, as the acknowledgments which the author makes for arguments devised by Professor Lerner, Dr. Helen Makower and others testify. But it is in detailed execution that the book is most outstandingly excellent. No one who has tried to draw a diagram which shall bring into prominence just those features that are to be illustrated, that shall enable curves to be distinguished from each other at a glance, that shall leave room for unmistakable labelling with letters in just the right places, and that may even make some æsthetic, architectural appeal, can fail to admire Professor Meade's achievement in this regard. He and his draughtsman have done a masterly job.

Lastly, the publisher and printer should be commended. This book is short enough to come out just the right, comfortable size for the hand when printed in large, splendid type on thick satisfying paper: printed, so far as I can see, without a single printer's error.

G. L. S. SHACKLE.

On Economic Theory and Socialism—Collected Papers. By MAURICE DOBB. Routledge & Kegan Paul Ltd. 1955. viii+293 pp. 21s.

This volume of Mr. Dobb's collected essays opens with some early theoretical papers, and notable among these is the " Sceptical View of the Theory of Wages " (1929), which it may well be timely to have reprinted. This essay was a protest against the exaggerated significance for wage policy attached at that time—in spite of Marshall's warning—to the marginal productivity theory of distribution. There was then much justification for Mr. Dobb's reference to " our inclination to be hoodwinked by a truism in the disguise of a pretentious formula ".

We come next to a series of contributions to the debate over economic calculation and socialist planning. One can certainly sympathise with Mr. Dobb's criticisms of the notion that there is some realistic significant sense in which a free-market competitive economy tends to " maximize " or " optimize " the social welfare, satisfaction, or something. Of course it is as much a rationalistic " Jacobin " fallacy to proclaim that a free market tends to maximise or optimise anything significant, as it was to imagine that the ballot box, or referendum, maximises wisdom, truth, or the Will of God. The free market is simply a flexible mechanism for continually getting certain inevitable decisions taken without recourse to political coercion; being a neutral mechanism, the quality of what comes out of it obviously depends on what the social framework feeds into it. Mr. Dobb does not answer this sort of case for a free-market economy since he is not, apparently, very interested in the avoidance of political coercion as such; (by some process of analytical abstraction he makes no mention in his various essays on the Soviet economy of the forced labour camps). The trouble with Mr. Dobb's contributions to the debate is not that they are critical of the dogmas of Professor Mises, his principal opponent, but that methodologically he and Mises have so much in common. Mr. Dobb and Professor Mises are both heirs of the James Mill-Ricardo tradition in contending that the mainly *a priori* reasoning of their particular brand of Marxist or liberalist economic theory can prove, as a scientific truth, the beneficence and rectitude, not merely of this or that piecemeal measure of policy, but of a wholesale ordering of the entire social economy. Neither Mr. Dobb nor Professor Mises ever allow any sort of historico-political relativism to qualify their dogmatism.

The paper " On Some Tendencies of Modern Economic Theory " attacks " subjective " theories of value, and gives an interesting and sophisticated defence of the classical labour and cost-of-production theory of value, based on the validity of a labour or cost theory in the case of perfect competition. Mr. Dobb agrees that " to the determination of monopoly price the classical labour theory admittedly offers no clue " (p. 115). It is, however, rather odd to find this sort of defence of the labour theory, as a realistic general theory of value, alongside, on the one hand, frequent complaints about the unrealistic abstractions of " bourgeois " economics, and, on the other hand, constant emphasis on the fact, if it is a fact, that we live " in a monopolistic age " (p. 99). An important point in the count against the labour and cost-of-production theories is just that they encouraged—(see the first two or three pages of Ricardo's *Principles*)—a misleading view, and an oversimplified classification and treatment, of market forms and conditions, to overcome which a new start, like that of Cournot, was necessary.

In the latter essays, indeed throughout most of the last three-quarters of the volume, the recurrent themes are the economic theories of Marx and the economic practices of the Soviet Union, about which, of course, in a series of papers, written over nearly a quarter of a century, not the smallest scintilla or soupçon of doubt or criticism is ever even faintly or implicitly discernible at any point whatsoever—Stalin and his policies receiving throughout a completely uncritical and even adulatory treatment. This attitude may be partly explicable as a kind of imitative reaction to the " all-in Marshall " atmosphere in which Mr. Dobb was enveloped in his early days at Cambridge.

From the essays on the Soviet economy and its statistics, there is one point of detail which might be taken up: exactly who does Mr. Dobb expect will have their confidence in his statistics fortified by his citation, as a source for international comparisons of steel production, of the late Lavrenti Beria ? (p. 118).

T. W. HUTCHISON.

International Economic Integration. By J. TINBERGEN. Elsevier, Amsterdam. Cleaver-Hume Press Ltd. 1955. 191 pp. 21s.

In this book Professor Tinbergen gives in the space of 150 pages the main points of the theory of international trade and payments, and a discussion of international integration in the West, as it is and as it might be. In addition, space has been found to insert some illustrative factual data. The elegance and simplicity of the text, which is based upon an extreme compression of the complex theorems under discussion, indicate the mastery exercised by the writer over his subject matter. His observations on the scope of international integration, his distinction between those functions which should be further centralised and those which should be decentralised, carry a refreshing sense of proportion and reality.

Professor Tinbergen tells us in his preface that the book is meant " for those not officially trained or not yet trained in economics ". I would venture to question whether that class of reader will draw the most benefit from this work. To appreciate the significance of the propositions so succinctly formulated, and of the underlying assumptions, surely one needs a fairly sophisticated reader. People not trained in economics may not only fail fully to appreciate the text, but might actually be misled by it. Indeed in one or two points I think that Professor Tinbergen has oversimplified. For instance it is not necessarily true that the productivity of capital is lower in highly developed countries than in less developed countries (p. 64); nor is a low income per head necessarily an indication that a country is underdeveloped. But all in all Professor Tinbergen's exposition constitutes an illuminating and stimulating summary of the main points of the theory of international trade and international co-operation. Trained students of economics will surely draw much benefit from this work, and they will also be able to appreciate the two elegant technical appendices.

H. MAKOWER.

Value, Capital and Rent. By KNUT WICKSELL. Translated by S. H. FROWEIN. With a Foreword by PROFESSOR G. L. S. SHACKLE. George Allen & Unwin Ltd. 1954. 180 pp. 18s.

This is an excellent translation of a well known work, graced with an interesting introduction from the pen of Professor Shackle. It is in this book that Wicksell lays the foundations of his general theory, familiar to us all from the *Lectures*. It is true that the corner stone of *Value, Capital and Rent* is provided by Walras and Böhm-Bawerck. But there is no comparison between the rather clumsy *leçons* of Walras, and Wicksell's elegant equations or between the tedious arithmetical tables and wordiness of Böhm and the precise and economical arguments of this book. Nor is there any lack of originality in a work which integrates a general equilibrium analysis with the Austrian capital theory and emerges with a unified solution to the problem of distribution.

Every economically literate student is familiar with Wicksell's monetary theory. There are many, however, who having come across some of the many attacks on the period of production in the literature, have neglected his " real " analysis which forms the subject matter of this book. There is, however, as Professor Shackle points out in his foreword, a quite remarkable unity in Wicksell's thought, and his monetary theory without this underlying general equilibrium analysis is like a roof without the house.

Moreover, if the modern reader will substitute " ratio of capital to labour " for " period of production " wherever the latter occurs, he can read through the whole book without feeling old-fashioned and will learn a lot into the bargain.

Lastly, a word on the general approach of this book. First, the analysis is mathematical but requires only the differential calculus. Objectors to mathematical economics should compare Wicksell's sedate and efficient journey through the complexities of the theory of value and distribution with any " literary " work known to them. Second, great importance is attached to general as well as " partial " equilibrium problems and the flavour of the book is definitely not Marshallian. The modern reader brought up on Hicks and Leontief may well feel more at home here than in the intelligent businessman's " guide to economics " which it was Marshall's ambition to write and which he did write.

F. H. HAHN.

The Mechanism of Cheap Money : A Study of British Monetary Policy, 1931–1939. By Edward Nevin. University of Wales Press. 1955. xiii+350 pp. 25s.

Many of the arguments and facts and even some of the statistical tables of this book are already familiar, but Dr. Nevin has integrated them, along with his own researches, into a comprehensive analysis of such high quality that the book must surely become a standard text. A number of logical errors will, however, need to be corrected in future editions.

The first two chapters provide a background : the first dealing rather pedestrianly with the collapse of gold ; the second dealing quite brilliantly with monetary theory. Within its limitations, the reviewer knows of no exposition of the factors underlying liquidity preference which is anything like as good. The chief limitation consists in asset choice being discussed solely in terms of money and bonds; it is only in Chapter VI that this limitation is rectified by the introduction of the choice between gilt-edged and industrials, although the correct complement would have been the choice between bonds and equities.

Chapters III to V describe and analyse the famous conversion operation of 1932 and the ensuing policy up to 1939. Three points stand out: (1) Dr. Nevin's circumstantial evidence that departmental intervention was small, and restricted to the Issue Department of the Bank of England ; (2) his analysis of the banks' " thirty per cent. rule "—the conclusions of which are too complex to summarise here; and (3) the conclusion that the effect of the official controls in the capital market (especially the prohibition of foreign issues) was negligible.

The argument by which the author arrives at the last conclusion appears to the reviewer to be fallacious. The evidence which is offered only shows that there was no unsatisfied demand for foreign securities; this surely means that, had foreign issues been permitted, they would have had a considerable effect on the market. Without offering any evidence on the supply side, however, Dr. Nevin concludes that the restrictions " made no material contribution to cheap money . . . " (p. 173).

The remaining four chapters extend the analysis into the capital market and investigate the effects of cheap money on spending. Evidence is marshalled against any significant effect (as far as the long-term rate is concerned) except in housing; there is nothing new here except the stress which Dr. Nevin lays on the easing of house deposit requirements. The short-term rate, far from appearing in the " honours list ", is not even mentioned. Dr. Nevin goes on to argue the importance of the availability of loans as distinct from their price. This again is not a new theme but the variations on it are well developed, particularly with regard to the imperfections in the market.

W. T. Newlyn.

British Industry, 1700–1950. By Walther G. Hoffmann. Translated by W. O. Henderson and W. H. Chaloner. Blackwell. 1955. xxiii+338 pp. 35s.

Since 1934, when Professor Hoffmann first published an index of British industrial production, his figures have been used in several influential studies of the quantitative aspects of industrial growth. The present book, enlarged from the German original of 1940, contains a revision of the earlier figures, indices of the output of many individual industries, and a lengthy account both of the methods of compiling the indices and of the conclusions to be drawn from them. This fuller discussion is much less known than the indices themselves, and Dr. Henderson and Dr. Chaloner have done a useful service in enabling a larger public to estimate the value of Professor Hoffmann's work. They have had the co-operation of the author, who has added material on the period between 1935 (at which point the German version ended) and 1950.

Briefly, the main propositions of the book are these: that a reliable index of industrial production can be constructed for the last 250 years and that (with 1913 as base year) it rises from 1·19 in 1700 to 164·0 in 1950; that the growth of industrial production was accelerating until 1830 and has since been decelerating, though the maximum rate of growth of the output of " producer-goods " was not reached until 1847; that both industrial production as a whole and the output of most individual industries have throughout the period fluctuated in cycles of about 20 years' duration, though with a tendency to slightly greater length in the nineteenth than in the eighteenth century; and that the output of most industries shows rapid growth at first, then slower growth and, in some cases, a third phase of absolute decline. The truth of these propositions must rest on the reliability of the primary material, on its relevance to the purposes for which it has been used, and on the soundness of the statistical methods employed.

It is because the first two requirements appear in so many cases not to be adequately met that serious doubts arise. The indices for many industries are computed from figures that do not refer to total output and may very likely move in quite a different way. The index for woollen and worsted cloth, for instance, is computed for 1739–1820 from figures for the West Riding alone, with no allowance for the fact that the expansion in that region was partly offset by decline in other important producing districts. The index of coal output in the eighteenth century is derived solely from the shipments entering London, and for the period 1801–19 solely from the amounts shipped from north-east ports to London. Yet by this time large amounts were being carried on the new canal system and new inland demands for coal were coming from steam-operated factories. There is also, for the nineteenth and twentieth centuries, a persistent tendency to exaggerate earlier in proportion to later growth by failing to allow for the increasing complexity of the product of many industries. This is particularly relevant to the output of machinery, and Professor Hoffmann's own remarks about the problems of estimating this make it seem very probable that his index of machinery production must be rising too slowly by the late nineteenth century. Similarly, the shipbuilding index treats sailing and steam tonnage as exact equivalents, the railway construction index makes no allowance for the additional equipment needed on existing routes in order to handle denser traffic and heavier loads, and the tramway construction index allows for no difference between horse-tramways and electric tramways. A further weakness is the material which has determined the calculation of the weights. An attempt has been made to make these proportionate to net output at different periods, but the data for calculating net output are not good in the nineteenth century and appear utterly inadequate in the eighteenth. Professor Hoffmann gives his results for 1740 and 1783 but nowhere makes clear how he has reached them. They must be subject to a large margin of error.

Many other detailed criticisms could be made, for which there is no space in a single review, but which contribute to an evaluation of the work. Professor Hoffmann has gone through immense masses of material and shown much ingenuity in attempting the impossible. For the eighteenth century his index is too narrow in coverage and too speculative in construction to be of any use; in the nineteenth century it gradually improves, but is hardly good enough to serve as a basis for long-term comparative analysis, though the indices for some of the individual industries may be fairly reliable; from the late nineteenth century onwards, though imperfect, it is probably a useful indicator of the extent of some fundamental economic changes, but for recent years the more comprehensive indices which are available are to be preferred.

Since the figures of the index are so unreliable, conclusions based on an analysis of them are bound to be suspect, except where they are supported by other, better, evidence. Much that is valuable has already been done, and more can be done, to supply economic history with a firm, quantitative basis (though it is important not to keep exclusively to percentage rates of change, as Professor Hoffmann has done, but to pay attention to changes in absolute amounts as well). But historical statistics needed to be tested just as critically as other types of evidence. Regrettable as it may be, for much of the period there are not enough good primary statistics to support a wide-ranging study of the kind Professor Hoffmann has attempted and there is no way of turning bad statistics into good ones. Professor Hoffmann's generalisations about the character of British industrial growth must, therefore, be regarded as not proven, and his figures must be considered very insecure material for attempts to find common features in the growth of industrial economies.

W. Ashworth.

Introduction to International Trade and Finance. By Lorie Tarshis. John Wiley & Sons Inc., New York. Chapman & Hall Ltd. 1955. xv+536 pp. 48s.

The International Economy. By Walter Krause. Houghton Mifflin Company, Boston. Constable & Company Ltd. 1955. x+434 pp. 30s.

These two new textbooks in international economics are complements rather than substitutes; Professor Tarshis' primary purpose is to present analysis, and he therefore concentrates on the general and theoretical aspects, whereas Dr. Krause's main intention is to acquaint his readers with the various problems arising in the contemporary international economy, and possible ways of dealing with them.

It is more convenient to take Dr. Krause's book first. Here we have a well written introduction to most of the topics in applied international economics. After brief reference to basic analytical concepts and tools, the main impediments to the free exchange of goods and services are presented; this is followed by a section on investment and currency problems, including a discussion of economic development, welcome for its detail. A good deal of attention is paid throughout to international economic institutions.

The main drawback of Dr. Krause's method lies in the extent of his disregard of principles. The student who has no theoretical training in international economics other than that provided in this book, is unlikely to be able to grasp many of the points made by the author, who as it is had to omit or to simplify severely the analytical aspects of the topics under discussion. Therefore, in spite of its merits, it is open to doubt to what extent this book, by itself, will prove useful to the student who has not already acquired a sound theoretical background.

It is here that Professor Tarshis' approach comes into its own. Not that his book is confined to analysis; there is a good deal of descriptive material, both of a general character and relating more specifically to the contemporary scene, but this is intended less for its own sake, and more by way of illustrating the application of economic principles.

The argument proceeds along conventional lines. The exposition of the theory of international trade and capital movements is followed by the analysis of balance of payments adjustments under various conditions, and the text concludes with a brief discussion of a number of applied topics. It is a pity that the effect of international trade upon the distribution of income is omitted; this is an important subject, but rarely treated in textbooks.

Clarity in the exposition of theory is obviously of paramount importance for a book with the emphasis on analysis, but here Professor Tarshis' text to some extent disappoints. Often the material appears to be rather ill arranged (this holds particularly for the treatment of the national income-international trade relationship), and some of the definitions and explanations provided by the author may well confuse the newcomer—his extremely wide definition of balance of payments disequilibrium, for instance, and his treatment of gold movements.

At the same time, the book has many merits. Welcome realism is introduced into several of the theoretical chapters, and this is particularly valuable in his section on the basis for international trade, which does not concentrate attention on differences in comparative cost alone, but, through a number of instructive arithmetical examples, accords unusually prominent place to other factors influencing trade, e.g. to imperfect competition in both factor and product markets, and to transport costs. Also, the chapters containing more descriptive material are well presented. Students are therefore likely to learn a good deal about international economics, both theoretical and applied, from this work ; it is less certain, however, that the knowledge thus gained will form a coherent picture in their minds. But with a subject as complex as this, such a task is very difficult to achieve.

H. H. LIESNER.

Mathematics and Statistics for Economists. By GERHARD TINTNER. Constable & Co. Ltd. 1954. xiv + 363 pp. 30s.

This is an elementary text-book for economics students who have no training in mathematics. It is divided into three sections covering elementary mathematics, calculus and statistics (including probability). The field covered is extensive, but, being designed for the future econometrician it avoids illustrations from the physical sciences. The covering of the field is thin, index numbers are described in one page of text and illustrated by one worked example involving two commodities whilst half a page covers quadratic equations including the example. The illustrations are taken from economic sources wherever this can reasonably be done; a list of such sources is given in the preface. A feature of the book is the 101 sets of exercises, answers being given to the problems with odd numbers.

The economist who works through this book will obtain an excellent idea of many mathematical processes. He will have learnt something of graphs and equations, logarithms and series, determinants and linear equations, derivatives and integrals, moments and binomial distributions, tests of hypotheses and correlation. Examples used to illustrate mathematics, however, may be bad economics and there are few warnings of the dangers of applying methods and formulæ mechanically. We are told the examples " represent the efforts of econometricians to utilise statistical methods to obtain theoretically meaningful economic relationships " but there is little to indicate that " meaningful " relationships may not be " correct ". To say that an elasticity is unity is meaningful but may be incorrect. Despite these factors the chief qualification given about the methods demonstrated is that they are " not always the most modern ones ".

As one example, the student is likely to be impressed by the ease with which a straight line can be fitted to data by the method of least squares. Taking hints from the exercises he will " assume conditions are the same for the future as in the past " and extrapolate a price for potatoes eight years after the latest figure given and a consumption of cotton eighteen years after. These results were asked for on series which do not seem to have been linear in the past whilst the answer on cotton consumption is given to five significant figures with original data only recorded to two. Such exercises have to be tackled with sufficient humour to laugh at absurd results. The danger arises when the results do not look absurd.

As a second example there is a formula given for testing a 2 × 2 contingency table for correlations. In exercises on using this formula information is recorded in units of one million (to one decimal place) and the student must be excused if he makes implicit assumptions that babies in the United States are born in batches of one million, each batch consisting entirely of babies of one sex or that persons are only employed in groups of one million. The answers given in the book apparently make these assumptions, for the differences, which are highly significant even when allowances are made for rounding, are stated to be " non-significant ".

There are other annoying features in the book. Some are just mistakes like the inclusion of " Suggestions for further study " in the chapter on index numbers, the differentiation of a function of a function, as if one term were $3x$ when it has twice previously been recorded as $3x^2$, and the spelling of Kendall as Kendal. There is a tendency to omit mention of the units used, such as giving the price of potatoes as " 25 " and asking for the demand. There is a suggestion that for obtaining the variance from grouped data Sheppard's correction should always be applied. There is the example fitting a normal distribution to a distribution of millions of families approaching the rectilinear with the omission of the portion of the normal distribution outside the limits of the original distribution so that the normal distribution has markedly fewer families in it, and the answer that the test for goodness of fit is " non-significant ", having been told that not significant " means that we get a reasonably good fit ".

An interesting book of mathematical methods which is likely to intrigue and then disillusion the economist who seeks an easy approach to his subject. Probably most learning passes through such stages.

H. S. Booker.

History of the Second World War. Merchant Shipping and the Demands of War. By C. B. A. Behrens. H.M.S.O. and Longmans, Green & Co. 1955. xix+494 pp. 35s.

Miss Behrens has produced an immensely readable essay on the practice of planning. Her book is not an account of the wartime experiences of the British shipping industry, but of the way in which the authorities that were faced with the problem of controlling shipping during the war dealt with those who made demands for sea transport.

There were three chief claimants on sea transport services in the early part of the war—the Ministry of Food, the Ministry of Supply, and the armed forces. Each of them considered it had the function of determining what it needed to have carried by sea, and assumed that the shipping authority's duty was simply to ensure that transport was provided. Since there was no adequate machinery to co-ordinate their demands, these demands exceeded the capacity of available shipping. The shipping authorities had therefore, willy-nilly, to cut down the departmental programmes—to become the arbiters between departments in determining what should be imported. Once convinced that the cutting of supplies was a necessary evil, the civilian departments themselves adjusted their programmes to fit transport possibilities; and so rationing of imports was put on a more carefully considered basis. For some months in 1942 the shipping situation seemed well in hand, despite the change in the possibilities of United States help after Pearl Harbour. But the fighting services remained outside the system of control; they successfully claimed absolute priority for their demands—demands which of necessity were often hurriedly formulated and changed at short notice, but which (as investigation by Lord Cherwell showed) were at times greatly in excess of their real needs.

The personal intervention of the Prime Minister, in January, 1943, brought the British service departments to co-operate fully with the Ministry of War Transport planning staff. But by this time powerful new customers for sea transport had come on the scene—the American armed forces. The enormous American shipbuilding programme was already the only source from which heavy losses of ships could be replaced, and the maintenance of the British war effort depended on the allocation of a substantial part of the new American tonnage to meet British needs. In recognition of this, joint shipping budgets and joint control for Britain and the United States were inaugurated early in 1943. In relation to this joint shipping control, however, the United States service chiefs stood out as independent authorities whose demands could not be questioned. Like their British counterparts in 1941-42, they claimed absolute priority for everything they demanded. And their demands, it turned out in time, were based on an enormously inefficient and wasteful use of the ships they secured. The result was an apparently acute shipping shortage late in 1944; a shortage found to be illusory when, in January, 1945, the President at last disciplined his service chiefs and compelled them to examine and reform some of their practices.

The whole of Miss Behrens' book points a moral—that control of a service must embrace the acceptance of control by all who have demands on the service. This is a platitude; but the position of the heads of fighting forces in wartime is such that platitudes may long be disregarded. The ultimate legatee of the early wartime system of absolute priority for all military demands was the province of Bengal, where 1½ million people died in the 1943 famine. Only good luck prevented similar disasters from happening elsewhere in later years.

RALPH DAVIS.

Economic Essays in Commemoration of the Dundee School of Economics, 1931–1955. Edited by J. K. EASTHAM. Economists' Bookshop, for the School of Economics, Dundee. 1955.

The School of Economics at Dundee, founded by Mr. George Bonar, after twenty-one sessions of vigorous life on its own, teaching for London degrees and conducting research, is now absorbed into the University of St. Andrews as the nucleus of a new School of Social Science. It was a happy thought of six past and recent members of its staff to commemorate its independent life by producing a volume of special essays, each relating to a field of work which occupied their attention whilst they were teaching there. There can be few University departments of this size and with so short a life which have had three members of its staff go on to Chairs and three to Senior Lectureships.

The quality of the essays is what might be expected from this record. As they have no common theme, it is not possible in a short space to do more than indicate a few of the points of interest in them. Professor Black, in *Wicksell's Principle in the Distribution of Taxation*, summarises some work little known to English economists, and shows that the consequences of Wicksell's method of voting are less simple than he supposed. Professor Coase shows the importance in the origins of the Post Office monopoly of a desire to facilitate the examination of correspondence for treason and sedition. Some modern questions are asked by Mr. Lythe in an article on Scottish trade with the Baltic, 1550–1650. In a critical but sympathetic account of Hayek's cycle theory and later developments of the Ricardo effect, Mr. Gilbert suggests that it is not as completely irreconcilable with under-consumptionist views as is generally supposed. Professor Silcock tries to carry further the analysis of oligopolist situations with both product differentiations and selling costs. Lastly, the School's last Director of Studies and editor of the volume, Mr. Eastham, in an exploration of difficult terrain, the boundary between interest and profit theory, achieves some reconciliation of opposed views which does justice to Schumpeter's profit theory without prejudice to a liquidity theory of interest. Those who were concerned with the old School have reason to congratulate themselves on the volume and the achievement it represents.

P. FORD.

Foundations of the Australian Monetary System 1788-1851. By S. J. BUTLIN. Melbourne University Press and Cambridge University Press. 1954. xvi + 727 pp. 57s. 6d.

This is a work of scholarship. In some respects the reader may find it over-pedantic, but Professor Butlin has elected to give his version in the fullest possible detail, partly to exclude the necessity of others having to rediscover the facts, but mainly in order to establish the precise forms of the evolution of the institutions he describes. Because of the inaccuracies of previous writing in this field, the author has felt impelled to rewrite much of

Australia's general economic history. While he may sometimes seem to be less than generous to his predecessors, the thoroughness of his own researches makes his work a welcome addition to the literature.

The opening part of the story is very closely written, but for those who will stay the course there unfolds a fascinating story which seeks to trace the development of Australian monetary institutions from their primitive beginnings in a penal colony with initially no monetary arrangements at all through all the stages that led to relative maturity. Much of the earlier part of the book is concerned with the history of currency and this is, in its own right, a most interesting part of the chronicle. It is only at a later stage that banking proper becomes the major preoccupation. Two main lines of enquiry then begin to emerge: (1) what was the course and character of an economy subject to boom and slump in the 1820s, pastoral expansion in the 1830s, and slump once more in 1841–43? ; (2) were these experiences due to imported influences, or were they primarily due to endogenous factors?. Not only does one learn much about some of the leading Australian trading banks of today (and of many that fell by the wayside) but the bare bones of institutional history are clothed with flesh and blood by sketching the personalities of the men at the head of affairs. The changing structure of Australian banking is also delineated (e.g. the early emergence of branch banking—pp. 287ff.—due, not as so often supposed to an overriding Scottish influence, but to " competition working in an economy which was expanding geographically "). Again, there was an early " substitution of deposits for shareholders' capital as the most important source of loanable funds " (p. 307)—largely as a matter of accident. The savings banks are given a separate chapter and so is the foreign exchange market, which by the 1840s was already dominated by the banks (pp. 478ff.).

From the point of view of banking history, one of the most interesting chapters is that relating to banking practice and policy. Bank loans in Australia tend to be longer-term than in the United Kingdom and, although discountable paper long continued to be the technique most generally employed, latter-day practice in Australia may certainly be traced back to colonial times when the mortgage loan proper and cash credit repayable annually were by no means uncommon (pp. 505–7). Attitudes to reserves are also noted (" window-dressing " was not practised—p. 511—and there seems to have been general agreement that " one-third cash to the sum of deposits and notes " was " the proper ratio "—p. 512—though it was not always observed). The extent of competition and of agreements on rates are discussed. All along the line, structure and technique derive from the influence of local environment and on many an occasion departed from what was laid down from London.

One major criticism that must be made of the work as a whole is that the book tails off in a somewhat indeterminate way. A discussion of " legal tender " hardly provides an exciting finale. Moreover, the highly detailed story requires to be drawn together and there would seem to have been a strong case for highlighting the main lines of banking evolution in an effective conclusion. The appendices list and comment upon bibliographical and statistical sources, the available banking statistics for the period being published in full (pp. 586–705). The value of the study as a work of reference is greatly enhanced by the very complete index. It only remains to add that the book has been excellently produced.

J. S. G. Wilson.

Banking Systems. Edited by B. H. Beckhart. Colombia University Press, New York. 1954. xviii + 934 pp.

The present work is in no sense a second edition of the earlier *Foreign Banking Systems*, of which Professor Beckhart was one of the joint editors. It is an entirely new venture and, without doubt, a much better book than its predecessor. It seeks to present recent information not easily obtained elsewhere about the banking systems of sixteen countries, mainly in the Americas, Europe and Asia. In each case, the discussion of banking arrangements is prefaced by an outline of the country's economy. It is the type of work that will be invaluable as a source of reference both to bankers and to academic specialists. Even though much of the detail will inevitably date fairly rapidly, it will deserve a permanent place on library shelves as a record of its period.

The arrangement of the book is alphabetical and, while this will assist ready reference, it might have been more useful to group regionally the countries covered, especially if this could have been combined with an editorial introduction to each section outlining the extent to which common traditions are shared by particular groups of banking systems and stressing why within a group certain differences and contrasts have developed. Thus the Continental European countries—France, Germany, Italy, the Netherlands, Sweden and Switzerland—all share a tradition of mixed deposit and investment banking and it would have been interesting to determine the reasons why Germany and Switzerland have not greatly modified the original tradition, while the others in varying degree have tended to separate the two functions. The Latin American countries provide another appropriate, if incompletely homogeneous, grouping within which to study the interplay of external influence and local experience. Unfortunately, only Brazil, Cuba and Mexico have been included and it would have added greatly to the value of the book to have had chapters on Argentina and Chile, two of the more important Latin American countries on which banking publications in English are somewhat scanty. Not all of the British Commonwealth countries are here represented and, in any case, there is already a reasonably adequate literature in this field. Nevertheless, a group study of the banking systems selected—the United Kingdom, Canada, Australia and India—would have provided some interesting comparisons and contrasts. It was right that there should have been a chapter on the United States, the banking institutions of which have in recent years been increasingly though not always wisely emulated in rather dissimilar environments. The inclusion of Japan is also most welcome and this chapter will help to fill a very real gap. On the other hand, it is astonishing to find how little the institutional structure of Soviet banking seems to have changed with the years.

On the whole, the several contributors maintain a very high standard of objectivity and only rarely do political persuasions obtrude. There is, however, some unevenness in the quality of the respective chapters, but this is almost inevitable in any symposium. A number of more specific comments might also be made. It seemed somewhat surprising that there should be no mention of the " federal funds " market in the United States, that it should be thought useful to compare Soviet banking with United States institutions, which serve quite a different type of economy, and that in the index there should be no reference to qualitative or quantitative credit controls, or indeed (except for Cuba) to credit control in general. One might further disagree with the inclusion in the French *Haute Banque* (p. 227) of Jewish families. Strictly speaking, only certain of the Protestant houses were so described. The reference—in the German chapter—to "central banking institutions with special tasks" is ambiguous. One interesting apparent inconsistency which deserves to be explained concerns the reference (in the Cuban chapter at p. 197) to the Canadian influence in prompting the wide use of the overdraft, whereas in Canada itself (for legal and institutional reasons) the overdraft, though tolerated to some extent *de facto*, is frowned upon by the banks. But these are minor matters and this book deserves both to be generously received and widely read.

J. S. G. WILSON.

Grundlagen der Betriebswirtschaftslehre. By ERICH GUTENBERG. Second edition. Springer-Verlag, Berlin. 1955. Vol. I, x + 391 pp.; Vol. II, xi + 440 pp.

This work, which is a contribution to the *Enzyklopädie der Rechts- und Staatswissenschaft*, sets out to present a comprehensive survey of "Betriebswirtschaftslehre", which encompasses both the management and the theory of the firm. These two volumes deal with production and marketing, respectively, and a third volume on business finance is on the way.

Vol. I deals first with the factors affecting the productivity of labour, equipment, materials and management. It discusses such matters as wage fixing by job evaluation, the optimum size of batches, the cost of flexibility in production planning, the scope of standing orders, and the rationality of administrative decisions. Then follows a discussion of production and cost theory, and especially of the consequences of assuming fixed coefficients and constant variable costs, which are regarded as characteristic of manufacturing industry. Part 1 of Vol. II deals with the "internal" work of the sales department, such as sales planning and market surveys. The second part, on marketing, contains sections on wholesale and retail distribution, on pricing in markets of various forms, on the choice of products, and on advertising. The discussion ranges widely, from advocacy of a particular type of kinked demand curve to observations on the placing of neon signs.

Some sections, like those on the production function and the kinked demand curve, make efforts to break new ground, while others are mere summaries. The sections on administrative theory might have benefited by some consideration of the work of H. A. Simon. The discussion of cost calculations is at times misleading (e.g., I, 257) because it employs the "allocation" methods of cost accounting rather than those suggested by the "opportunity cost" approach. Also there are some question-begging welfare judgments, e.g. (II, 354) that if a firm diverts customers from its competitors by superior advertising one would approve only if that firm is also "technically and economically (betriebswirtschaftlich) the better". Considered as a survey, the work has the virtues of orderly arrangement, wide range, and clear exposition; but some sections (e.g. on advertising) are encumbered with excessive detail, and the whole is somewhat lacking in unity, both in the material discussed and in the level of the discourse.

LUCIEN FOLDES.

Labor Productivity in Soviet and American Industry. By WALTER GALENSON. Columbia University Press. London: Geoffrey Cumberlege. 1955. xiv+273 pp. 45s.

Professor Galenson's study is mainly devoted to a comparison of pre-war output per wage earner year in certain Soviet and American industries. Soviet pre-war productivity is estimated to have averaged 40 per cent. of that in the United States. The sample covers nearly a third of Russian pre-war industrial employment, but because of the uneven level of technical development in Soviet industry, conclusions about the general level of industrial productivity must be tentative. Nevertheless, it is clear that, although Russian pre-war productivity achievements were well below those of America, they were good by British standards in several industries.

As there is no Soviet production census, the Soviet data were assembled from various technical and government publications. Professor Galenson has shown great ingenuity in collating these—a task requiring considerable knowledge of Soviet administrative practice. In general, the Soviet employment data seem to cover the same production units as the output data and the productivity estimates are more valid than one would normally expect from non-census information, but where there are discrepancies in coverage or the employment figures are the author's estimates, there are unknown although probably small risks of error. The estimates for machinery industries are particularly vulnerable to error, because Soviet data only indicate the main output of an industry, whereas the American census shows secondary products which may represent as much as a third of output. In such cases, Galenson simply assumes that the proportionate importance of secondary products and spare parts is the same in both countries.

Professor Galenson also deals with productivity trends from 1928 onwards, and makes some guesses about the future. It is extremely difficult to quantify the overall rate of growth of Russian industry in terms of a significant comparison with Western countries but the estimates confirm that Russian industrial productivity growth from 1928 to 1940 was much more rapid than anything in American experience. For the post-war period, the evidence is very scanty, and the problem complicated by wartime Soviet losses, but it seems that American productivity rose considerably more than Soviet between pre-war and 1950, when account is taken of the large increase in Soviet working hours.

A. MADDISON.

Henry George. By CHARLES ALBRO BARKER. Oxford University Press. London: Geoffrey Cumberlege. 1955. xvii+696 pp. 57s. 6d.

This volume is not only a first-rate biography, it is also a fascinating case study in economic and social propaganda. As professional journalist, social reformer, writer, orator, political campaigner, and many other things besides, Henry George's energies were mainly spent in the twilight zone that separates " practical " from " scientific " contributions to economic and social affairs. His greatest work, *Progress and Poverty*, is an excellent example of analytic thinking arising from a preoccupation with contemporary practical problems. Therein lay much of the strength of its appeal, which, reinforced by George's literary skill, religious fervour, and emotional intensity made it the most widely read social critique of its day.

Professor Barker has all the necessary enthusiasm for his task without the usual concomitant tendency to gloss over the weaknesses or to exaggerate the importance of his subject. In view of the extent of George's influence and the adulation he inspired this is no mean achievement. Professor Barker delineates George's historical background and his intellectual development with infinite care, and then conducts us through the numerous channels of George's later life—his tours as lecturer and reporter in Ireland, England, Australia and elsewhere, his later publications, and his political campaigns up to his " martyrdom " in 1897. George's impact on his generation was truly remarkable, for he enlisted the support of wealthy businessmen, labour leaders, eminent scientists, clergymen of all denominations, and leading politicians in many countries. His relations with the academic economists of his day are of special interest to readers of this journal. He exerted a powerful influence on such men as Wicksteed, Clark and Fetter (whose name Professor Barker omits), though they soon rejected his specific doctrines, and even so conservative an economist as J. L. Laughlin acknowledged, in 1892, that Henry George had " stimulated interest in political economy . . . to an extent not to be assigned to any other writer " in America. But while Professor Barker pays detailed attention to socialism, the land reform movement, and the fiscal, political and moral legacies of George's career, there is no thorough-going attempt to assess his place in the history of economic thought. In view of the wealth of material provided, perhaps this complaint is sheer ingratitude.

The author has largely dispensed with footnotes, giving instead a 45-page bibliographical appendix. On page 557 there is a possible confusion between Simon Newcomb and Simon Nelson Patten, but otherwise there are no serious misprints.

A. W. COATS.

Les Classes Sociales aux États-Unis. École Pratique des Hautes Études. Centre d'Études Économiques. *Études et Mémoires.* 15. By F. Bouriez-Gregg. Librairie Armand Colin. Paris. 1954. pp. 234.

It is remarkable that we have neither an adequate contemporary social history of the United States (the Beards' work remains standard) nor a satisfactory general account of the American system of social stratification. Perhaps some members of the younger generation in American social history and sociology will in time make good these deficiencies. Meanwhile, along with Kurt Mayer's brief *Class and Society* (New York, 1955) and the collection of articles and excerpts edited by Reinhard Bendix and Seymour M. Lipset, *Class, Status, Power* (London, 1954), the present work will serve European and even American scholars as an introduction to the problem of the American class system.

Its limitations, however, are many. It appears to depend upon the incomplete resources of French libraries. Its historical sections are cursory and stereotyped. The author attributes undue significance to certain American inquiries into popular attitudes towards class phenomena, which were executed with extreme disregard for the larger context in which these attitudes developed. The book attempts an analysis of that context but its slight treatment of political problems and its nominal attention to the American economy preclude any substantial or new interpretations. Its value in fact is that of an extended bibliographical essay. And, of course, it will do as a corrective for those under the impression that classes are either missing or unimportant in the United States.

NORMAN BIRNBAUM.

Marginal Cost Price-Output Control. By B. P. BECKWITH. viii + 283 pp. Columbia University Press. London: Cumberlege. 1955.

Dr. Beckwith follows the tradition of those socialist economists who advocate the adoption of marginal cost pricing throughout the economy. Half the book is devoted to a critical survey of the development of this doctrine from Launhardt to Little. This is informative and well written, but the criticism tends to be ungenerous. The rest of the work is a restatement of the doctrine. Here the main point, which is alleged to be widely ignored, is that a clear line must be drawn between " marginal analysis ", which is suitable for finding the ideal output from given investment, and " total analysis " (taking surpluses into account), which determines ideal investment. One would have thought that both total and marginal conditions were generally needed for the solution of both problems, and that in any case the distinction is fairly familiar in so far as it is valid. Other contentions are also open to doubt, e.g. that the desirability of the ends of conduct can be scientifically determined; that the concepts of long-run price and marginal cost are useless ; and that the problem of ideal price can be separated from that of ideal income distribution. Towards the end there is a novel and stimulating, though sometimes rather ingenuous, discussion of the practical application of marginal cost pricing. Some of the suggestions might usefully be adopted in practice independently of the main scheme.

LUCIEN FOLDES.

The Economic Development of Syria. Report of a Mission organised by the International Bank for Reconstruction and Development at the request of the Government of Syria. Johns Hopkins Press. London : Geoffrey Cumberlege. 1955. xviii + 486 pp. 60s.

This is not, and does not set out to be, an encyclopædic account of economic resources and potentialities in Syria. The Mission have undertaken the more immediately useful task of recommending priorities for development by Government action within the next five or six years, having regard to the rate of public expenditure which Syria might appropriately undertake. The main problem is to balance long-term aims against the advantages of short-term projects which would yield more rapid results with minimum capital outlay. For example, although a development programme for Syria must focus primarily on agriculture, which directly employs some 70% of the population, and although irrigation is the principal means by which agriculture can be extended and improved, the Mission recommend the postponement of Euphrates irrigation projects, which will one day be by far the most important but require much preparatory work and heavy capital outlay. They favour instead certain projects, costing much less, which can be expected to yield substantial results in the near future. Again, in the field of transport, the Mission do not favour the overhaul at present of the antiquated railway system but recommend the extension and widening of roads, especially to improve communications connecting the increasingly important grain- and cotton-growing region of the Jezireh with Aleppo, and Aleppo with the rising port of Latakia. On the other hand, the initiation of work on longer-term development is included in such recommendations as those for soil surveys, land reform, technical training, preventive medicine and community planning. As regards industry, the Syrian case is unusual for an underdeveloped country in that the Mission foresee a slackening in the rate of industrialisation, which has been rapid since the war, and recommend a downward revision of tariffs as an incentive to cost reduction.

A. M. CARSTAIRS.

Income and Wealth. Series V, edited by SIMON KUZNETS. International Association for Research in Income and Wealth. Bowes and Bowes. 1955. xiv + 242 pp. 42s.

This work, the fifth of a series published under the auspices of the International Association for Research in Income and Wealth, comprises six papers prepared for the Association's meeting at Castelgandolfo in 1953. The six papers present for six countries (Britain, France, Germany, Denmark, Hungary and Japan) " long-term estimates of national income or wealth, and components—for possible use in the study of economic growth " (p.vii).

The adjective "long-term ", in this context, means going back to 1900 or even earlier, sometimes as far back as 1870. The phrase " income or wealth " also requires clarification, for it usually means income only, the French contribution, by François Perroux, being the only one which provides data on capital (see his section on *Changements dans la structure de la fortune privée*).

While greatly impressed by the amount of work which has been done by the authors and their fellow statisticians in the six countries concerned, I cannot honestly say that I found this a stimulating book, mainly (I suppose) because I remain unconvinced that national accounting concepts provide a good basis for the compilation of statistics intended to illuminate the process of long-term economic growth.

It is surely significant that François Perroux, the only contributor to concern himself with the use, as well as the compilation, of the statistics presented, comments sceptically (p. 77) on " l'emploi d'un modèle quantitatif à nombre très restreint de variables " and concludes (p. 78) that " l'économie nationale, la société nationale dont nous étudions la croissance, ne sauraient être comprises dans leur mouvement par des additions de flux et de stocks, non plus que par la juxtaposition d'indicateurs de production et de bien-être concernant les groupes sociaux ".

BRIAN TEW.

The Rôle of the Economist as Official Adviser. By W. A. JOHR and H. W. SINGER. Foreword by E. A. G. ROBINSON. Allen & Unwin. 1955. pp. xxii + 150. 15s.

In 1947, Dr. W. A. Johr, drawing on Swiss experience, published a 62-page booklet on " the judgement of concrete problems of economic policy ", and Dr. H. W. Singer, reviewing it for the *Economic Journal* in 1952, described it as a " gem ", which should be " of intriguing interest to any economist whose job it is, or was, or will be, to give advice to politicians, businessmen or other ' applicants ' of economics ". One economist thus intrigued was the co-editor of the *Economic Journal*, Professor E. A. G. Robinson, and it was at his suggestion that the present book was contrived. Its base is Dr.

Johr's original essay, but this has been revised and expanded, both by Dr. Johr himself and by Dr. Singer who, at a number of stages in the argument, rectifies an omission which he had earlier criticised by adding observations from experience in an *international* organisation. A comment on Tinbergen's *Theory of Economic Policy* has been added, while Part II of the book consists of a second essay by Dr. Johr, on " the problem of the economic order ". Professor Robinson has himself contributed a four page foreword.

Is the result as valuable as Dr. Singer originally suggested ? Certainly, anyone who has had experience of working in or for government will find in it a whole host of reminders of his own recollections and, indeed, an *organisation* to his thoughts which will be useful even if, as is very probable, he finds himself (along with Professor Robinson) in less than full agreement with the basic classification. The usefulness of the book to the newcomer to such activities, on the other hand, is open to greater doubt. First, so much of the wisdom in this book is encased in generalisations which can only be appreciated *after* experience has been bought. Secondly, the present essay, like its parent, still treats of the economist in government as mainly a specialist memorandum writer. Such, of course, he may be. But in this country, at any rate, it is likely far more often that the economist will be one specialist contributor to a group or committee of administrators. In such circumstances, the " art of the possible " becomes a prime determinant of effectiveness. The economist can always preserve his methodological purism in a minority report, but if he does so he must be warned that the value of such protests is likely to vary inversely with their frequency.

R. C. TRESS.

SHORTER NOTICES

The Works and Correspondence of David Ricardo. Edited by PIERO SRAFFA with the collaboration of M. H. DOBB. Vol. X. Biographical Miscellany. Cambridge University Press, for the Royal Economic Society. 1955. x+424 pp. 24s. (16s. to Members)

Except for the Index still to come, this tenth volume completes the Sraffa edition. We have here the Memoir by one of Ricardo's brothers, Addenda to the Memoir by the Editor, a section on Ricardo in Business, a selection of Family and Private Letters, and a Journal of a Tour on the Continent made in 1822. The meticulous and omniscient scholarship of the Editor is in evidence on every detail of Ricardo's family connections, business activities, investments, residences and estates, and the editions of his writings. While of the greatest biographical and " period " interest, this volume does not extend much further the knowledge of Ricardo's intellectual development, or of what he read and when.

The Alphabet of Economic Science. By PHILIP H. WICKSTEED. Kelley & Millman Inc., New York. 1955. xiii+142 pp. $4.50.

This little book of about 140 pages, published in 1888, is really an alphabet of marginal analysis, and still may be found most instructive by a non-mathematical reader. The *Alphabet* also has much historical interest as probably the first book to employ the term " marginal utility ". It comes in an excellent series of Reprints of Economic Classics most enterprisingly undertaken by Messrs. Kelley & Millman of New York, who offer a considerable reduction in price to those who join their economists' book club.

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Benelux : The Formation of the Common Customs[1]

By J. E. Meade

A first and basic step in the formation of an economic union is the formation of a customs union in the sense of the imposition of a single uniform tariff of duties on imports into the partner countries from third countries and the removal of such duties on the flow of trade between the partner countries. It is the purpose of this article to give an account of some of the problems which arose when the Benelux countries, on January 1st, 1948, took this first step towards the formation of their economic union.

This first step has proved to be the easiest task in the building of the full Benelux economic union. But even so some important problems arose. There were technical difficulties due to the fact that in a number of points the pre-existing Dutch and Belgium-Luxembourg tariff systems differed greatly from each other.

In the first place, the classification of commodities for customs purposes was quite different in the pre-Benelux Dutch and Belgium-Luxembourg tariffs. The Dutch had a short list of products under 160 headings with 850 sub-headings, the order of the products on the list being simply alphabetical and without reference to the nature of the goods themselves. On the other hand, the Belgium-Luxembourg tariff was a much more elaborate and scientific structure starting off with 21 main divisions by type of product, sub-divided into 1,200 main headings and then into 3,600 sub-headings according to the nature of the products within the main divisions. Indeed, this systematic classification which had been introduced by a Belgian law of 8th May, 1924, had, together with the French tariff, served as a model on which the systematic League-of-Nations Draft Customs Nomenclature of 1937 had been based. The Benelux negotiators adopted in this respect the Belgian principle ; and the common Benelux tariff was based, with minor modifications, upon the League-of-Nations classification.

Secondly, only the relatively few products named on the Dutch list were subject to import duty. Everything which did not appear on the list was free of duty. The Belgium-Luxembourg list on the other hand attempted to classify all products whether they were dutiable or not. Any product which was found not to appear on the list was to be treated for import duty purposes in the same way as the named product to which it was most similar. This latter principle was adopted for the Benelux tariff. Any product not included on the list was to be assimilated for tax treatment to the most similar product already on the list ; and, in addition, in case of doubt it was to be assimilated to the product which paid the highest rate of duty.

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[1] This article has been written in the course of the preparation for the Royal Institute of International Affairs, with the help of the Economic Research Division of the London School of Economics, of a study on the formation of the Benelux economic union. Much of the material has been taken from two admirable books on the subject : Max Weisglas, *Benelux : Van Nabuurstaten tot Uniepartners*, Amsterdam, 1949 ; and Institut National de la Statistique et des Etudes Economiques, *Le Bénélux*, Paris, 1953. I would also like to thank the many Belgian, Dutch, and Luxembourg officials who have helped me both in providing documents and also in conversation on the subject.

A third problem was presented by the fact that the Dutch tariff was mainly on an *ad valorem* basis, while the Belgium-Luxembourg tariff was in the main specific. Thus of the 850 dutiable items in the Dutch tariff some 700 were taxable on an *ad valorem* basis, some 100 on a specific basis, and the remainder on a combined specific and *ad valorem* basis. But in the Belgium-Luxembourg tariff of more than 3,000 dutiable items only 400 were taxable on an *ad valorem* basis. The solution adopted for this problem was to impose most of the Benelux duties upon an *ad valorem* basis ; indeed, in the final Benelux tariff specific duties were even rarer than in the old Dutch tariff.

The choice of an *ad valorem* basis for the new tariff was, no doubt, greatly influenced by the desirability of such a system in order to maintain the protective effect of a given tariff, and to preserve the real value of the customs revenue, in a period of rapidly moving commodity prices. Indeed, the Belgians and Luxembourgers with the inflation of commodity prices between 1939 and 1945 had already had a sharp experience of the way in which a substantial rise in commodity prices can lower the protective effect of, and the real value of the revenue from, a system of specific duties.

But there was another reason why the choice of the *ad valorem* principle for the Benelux tariff turned out to be a most fortunate one. In September, 1949, less than two years after the imposition of the common Benelux tariff, the guilder was devalued in terms of the franc. At this time sterling was devalued in terms of the dollar ; and the Dutch (who were experiencing a heavy deficit on their balance of payments) devalued with the United Kingdom, while the Belgians (whose balance of payments was more or less in equilibrium) followed sterling only part of the way in its devaluation. This adjustment of the rate of exchange between the two Benelux currencies involved an adjustment of all the specific items in the common tariff ; either the duty expressed in guilders had to be raised or the duty expressed in francs had to be lowered, in order to keep the duty at the same level in the two re-aligned national currencies. Fortunately most of the duties were on an *ad valorem* basis and needed no such adjustment. But the few existing specific duties had to be adjusted ; in some cases the duties were raised in terms of guilders, in some the duties were lowered in terms of francs, and for others the guilder duty was partially raised and the franc duty partially lowered. There can be no doubt that, if variations in exchange rates are ever likely to be used as a weapon of equilibration in balances of payments, it is important that the common tariff for the partners in any economic union should be fixed on an *ad valorem* basis.

A fourth, but minor, technical difference between the Dutch and the Belgium-Luxembourg tariffs was that in the Dutch system excise duties were collected separately, the customs duty representing only the additional protective element in the tax on the product concerned, whereas in the Belgium-Luxembourg system the rate of customs duty itself included both any relevant domestic excise duty and any additional protective element in the import duty. Since the Benelux excise duties were not unified at the same time as the imposition of the common Benelux customs duties in 1948, it was inevitable that the Dutch system should be applied to the Benelux tariff. That is to say, the Benelux customs duties expressed only the additional protective element in import duties ; and additional excise duties on the relevant imports were to be collected by each partner in accordance with the scale of excise duties levied domestically on its own produce.

The full application of this principle involved one particular adjustment in the taxation of Luxembourg products in the Belgian and Dutch markets. Under the treaty of economic union of 1921 between Belgium and Luxembourg, Belgium undertook to exempt Luxembourg wines from excise duty in the Belgium-Luxembourg market. Belgium herself was not a wine producer and did not, therefore, produce wines to be subject to her own excise duty. The result was frankly to protect Luxembourg wines in the Belgium-Luxembourg market against imports of wines from outside countries which would be subject to the excise duty. But by the general obligations of the General Agreement on Tariffs and Trade signed in Geneva in 1947 Belgium became bound not to levy excise duties on foreign products within the Belgium-Luxembourg Economic Union at a higher rate than those levied on Belgian and Luxembourg products themselves. In order to avoid this difficulty it was necessary that the Belgium-Luxembourg excise duties on wines should be included in the customs duties payable on imports of wines from third countries. Apart from the fact that this change would make these duties, like all other customs duties, subject to G.A.T.T. tariff negotiations, this would have been a purely formal alteration if it had not been for the entry of the Netherlands into the Benelux customs union. French wines, for example, on import into the Belgium-Luxembourg Economic Union would have paid as a customs duty what previously they paid as an excise duty, but in both cases Luxembourg wines would have been exempt. But it was now necessary to incorporate this new customs duty into the Benelux tariff ; and this was done by a protocol between the three partner countries of 22nd December, 1947, whereby they all agreed to raise the customs duty on wines in the proposed Benelux tariff so as to incorporate in it the previous Belgium-Luxembourg excise duty. This, of course, had the effect of giving Luxembourg wines this degree of tariff protection against French and other wines in the Dutch as well as in the Belgian market.

A fifth problem arose from the fact that with a common tariff of *ad valorem* duties it is desirable to have a common principle for the valuation for tax purposes at the point of import of the dutiable products. In the pre-Benelux Belgian system the rule had been to value imports at the highest of three possible figures : the normal wholesale price abroad, the normal wholesale price in Belgium, or the price actually paid by the importer. Under the pre-Benelux Dutch system the importer had a free choice of declaring *either* the current price (i.e. a price corresponding to the normal wholesale price abroad of the Belgian system) *or*, even though it was lower, the actual price paid provided that it was fixed under normal conditions. In both the Belgian and the Dutch systems the time and place relevant for the valuation was the same, namely, the time and place of the passage of the goods through the customs, the only difference in this respect being that the Belgian system did and the Dutch system did not include in the value of the goods any *inland* cost of transport of the goods to the point of passage through the customs. For the Benelux tariff the principle was adopted of valuing imports at the price which the exporter would normally obtain for them on delivery at the place of passage through the customs ; and it was agreed that, save for exceptional cases, this value could be considered as equivalent to the actual price paid for the goods with the addition of all charges (e.g. for transport, insurance, etc.) incurred in addition to the purchase price up to the passage through the customs.

Another secondary technical problem was raised by the fact that the pre-Benelux Belgian tariff was a double-column structure with two rates of duty—a lower and a higher—applicable to each dutiable product. The lower rate of duty was to be regarded as the normal rate of duty ; and the higher rate was to be applied only in exceptional cases against the products of particular countries who discriminated against Belgium. In fact since 1935 the column of higher rates had not been applied. The Dutch tariff, on the other hand, had only one column of duties, although existing legislation gave the power (which had in fact never been used) to apply specially heavy rates on products coming from some countries. The Benelux tariff has a double column of maximum and minimum rates, the minimum rate being the normal rate and the maximum rate (equal to double the minimum rate with a lower limit of 10 per cent.) being applicable only in exceptional cases against the products of countries which discriminate against Benelux products.

The actual administration of the customs has not been unified ; the customs administration of the Netherlands or of the Belgium-Luxembourg Economic Union imposes the duty according to the point of entry of the goods into the Benelux area. Nor have the general legislative provisions governing customs and excise been unified throughout the Benelux countries. For example, in Belgium appeal can be made to the ordinary courts against decisions of the customs authorities, whereas in the Netherlands appeal must be made to a special Tariff Commission. But the intention of the Benelux countries is ultimately to unify their customs legislation ; and a Draft General Law on Customs and Excise has been prepared to act as a statement of principles in these matters for the three partner countries. There have in fact been some measures of close co-operative action between the two customs authorities. Thus, while it is necessary to maintain a customs control at the common Belgium-Netherlands frontier so long as domestic excise and turnover taxes have not been unified and there are agricultural or other exceptions to the principle of free trade within the Benelux area, at a number of points on the common frontier these customs inspections are carried out at the same place as a single joint operation by both authorities. Moreover, in September, 1952, a Benelux Convention was signed making provision for joint administrative action to simplify customs and excise procedures, to prevent and punish fraud, and to collect the relevant taxes.

So much for the technical problems of forming a single customs system out of two separate and in many respects divergent national systems. The formation of a common customs also raised some problems of rather more basic economic importance. Three such problems should be noted in the case of the Benelux duties : first, the determination of the general level of the duties to be imposed on imports from the outside world ; second, the preferential arrangements to be made in regard to imports into the Benelux area of products from the overseas territories of Belgium and the Netherlands ; and third, the arrangements to be made for the division between the governments concerned of the revenue raised by means of the common customs duties.

As far as the height of the Benelux import duties was concerned, the main principle adopted was to take the Dutch and the Belgium-Luxembourg duties as they existed in 1939, converting specific duties in force at that date into *ad valorem* equivalents at the prices of the products ruling in 1939, and to take an average of these two national rates of duty to determine the *ad valorem* rate of duty for the product concerned in the joint Benelux tariff. Two subsidiary principles were also generally to be observed : first, that in no case should the final Benelux duty be higher than the higher of the pre-existing Belgian and Dutch duties ; and, second, that where there had previously been free entry into one of the partners free entry should be maintained in the final Benelux tariff. None of these principles was to be applied automatically in every case and without any exceptions ; they were regarded rather in the light of guiding principles ; and in the fixing of a number of rates account was taken of special circumstances of the special industries or occupations concerned.

In normal conditions the choice of a single rate of import duty might in many cases have been expected to give rise to serious conflicts between the national interests involved. But in the case of the Benelux tariff the necessary process of reaching agreement between the governments and of obtaining the consent of the parliaments concerned was made much easier by the special post-war conditions ruling at the time at which these negotiations took place. In these immediate post-war years rates of import duty had temporarily at least lost much of their importance. It was scarcity of overseas supplies and scarcities of overseas currencies for the purchase of supplies which caused imports to be limited in amounts. In the conditions of extreme scarcity of supplies then ruling the countries concerned would gladly have welcomed greater imports rather than have desired to protect domestic producers by means of import duties. Indeed, since the liberation no import duties had been levied in the Netherlands ; and in Belgium hardly any import duties had in fact been imposed. The operations of the two tariffs were largely suspended in order to avoid rises in prices of imports (particularly of necessities and of goods required for reconstruction) which would have made more difficult the existing attempts to control upward movements of prices and wages. Indeed, when the new Benelux tariff was itself put into force on 1st January, 1948, the application of many of the duties in this tariff was, for these reasons, also postponed for a further period.

Even so, cases of serious conflict of interest were not lacking. The most marked example of this occurred in the fixing of the Benelux import duty on tobacco. The previous Belgium-Luxembourg import duty was a heavy one, namely 500 francs per 100 kg. of unstripped and 900 francs per 100 kg. of stripped tobacco. On the other hand, the Dutch duty was a light one, namely Fl.1.40 (the equivalent of only 23 francs) per 100 kg. of leaf tobacco. This great difference reflected a real and marked divergence of interest. The high Belgian duty protected a substantial high-cost domestic production of tobacco which accounted for about one-third of domestic consumption in a normal year. On the other hand, the Dutch had no domestic production to protect but provided an important international market for dealings in tobacco. For the purpose of facilitating transit traffic, dealings in samples, and the storage of tobacco a low rate of import duty on raw tobacco was desirable ; and the problem of raising revenue was met by the Dutch through the excise on finished tobacco products—cigarettes, cigars, pipe tobacco. This conflict of interest led to serious difficulties. Finally in the Benelux tariff a compromise was reached with duties of 413 francs per 100 kg. of unstripped leaf and 578 francs per 100 kg. of stripped leaf. Since the average value of raw tobacco had risen some four times since the pre-war years, the mere maintenance of the old pre-war duties would have represented a very big cut in the protective incidence of the duty to Belgian domestic growers. The new duties thus marked a considerable reduction in Belgian protection ; nevertheless they meant for the Dutch a very substantial change from their previous policy of almost free import.

The fixation of a common Benelux rate of duty for each imported product threatened at first to raise another considerable difficulty. Both the Netherlands and Belgium had a number of important commercial treaties with other countries. These treaties contained, among other things, two important undertakings in so far as rates of duty on imports into the Netherlands or the Belgium-Luxembourg Economic Union were concerned : first, the Most-Favoured-Nation undertaking to give treatment to imports from the country concerned at least as favourable as that given to imports from any other country ; and second, undertakings not to levy import duties above a certain level on certain specified imports from the country concerned in return for undertakings by that other country not to raise above a stated level its duties on certain imports from the Netherlands or from the Belgium-Luxembourg Economic Union. Both these undertakings were capable of raising serious difficulties in the Benelux proposal to remove their customs duties on each other's products and to strike an average between the Dutch and the Belgian rates of duty for the formation of a joint tariff for imports from outside countries.

It is, of course, the Most-Favoured-Nation obligations which raise the most familiar and obvious obstacle to such a proposal. If, for example, Belgium totally removes her import duties on imports from the Netherlands but has a commercial treaty with the United Kingdom in which she has undertaken to give United Kingdom products as favourable treatment as any other foreign products on the Belgian market, must Belgium also totally remove her import duties on imports from the United Kingdom ? If this were so, then the Netherlands and Belgium could form a customs union only if they adopted a completely free-trade policy as regards imports from all countries with which either of them had a commercial treaty containing a Most-Favoured-Nation clause. It was on this rock that the proposal for mutual tariff reductions between the Netherlands and the Belgium-Luxembourg Economic Union contained in the Ouchy Convention of 1931 had foundered. But while this is the basic theoretical difficulty, it was not expected in the Benelux case to prove a formidable obstacle in fact. There was a general expectation and understanding that the main commercial powers regarded the formation of the Benelux Economic Union with a sufficiently favourable eye not to insist in this way on any theoretical Most-Favoured-Nation rights of this kind which they might possess.

A much more real problem was presented by the fact that the Netherlands and Belgium had undertaken not to raise their duties on imports of particular products from particular countries with which they had commercial agreements. For example, for motor vehicles Belgian import duties had an incidence of roughly 35 per cent. But the Dutch duties were bound in an agreement with the United States at 15 per cent. If an average had been struck between the Belgian rate of 35 per cent. and the Dutch rate of 15 per cent., the Benelux import duty would have been 25 per cent. But this would have meant the raising by the Dutch of their duty on American cars to 25 per cent., though they were bound by their existing agreement not to raise it above 15 per cent. In other words, in so far as the existing duties on imports into the Belgium–Luxembourg Economic Union or into the Netherlands were bound under existing commercial agreements the Benelux tariff would have had to incorporate in each case not an average between the two duties but the lower of the two duties, unless one of the partner countries was to disregard its obligation.

A further difficulty of exactly the same kind threatened to arise in the application of the Benelux tariff formula from the fact that the Belgian duties were largely specific and commodity prices had risen greatly since 1939. For the majority of products the *ad valorem* incidence of the Dutch duties in 1939 was appreciably lower than that of the Belgian duties. The averaging principle thus meant that in most cases there would be some reduction in the protective incidence of the Belgian duties below its 1939 level. But most of the Belgian duties were specific in nature and the mere rise of commodity prices between 1939 and the years immediately after the second world war had very greatly reduced the *ad valorem* value and so the protective incidence of the Belgian duties. Indeed, the averaging formula in very many cases meant that while there would be an appreciable reduction in the protective incidence of the Belgian tariff as compared with 1939, there would be an actual rise in the import duties levied in terms of Belgian francs on any particular product. But in those cases in which Belgium had a commercial treaty with some third country which bound a Belgian specific duty against increase, the application of the Benelux tariff formula would again be incompatible with an existing commercial obligation.

These serious difficulties were overcome by the good fortune that in 1947 the main commercial countries met together in Geneva at the meeting of the Preparatory Commission for the International Conference on Trade and Employment to draft the Charter for a proposed International Trade Organisation. In the course of this conference the countries concerned negotiated reductions and bindings of duties on the trade between them in a series of bilateral tariff agreements based on the Most-Favoured-Nation principle and supported by a multilateral trade agreement known as the General Agreement on Tariffs and Trade. This gave the Benelux countries the opportunity not only to ensure that there would in fact be a let-out from any Most-Favoured-Nation obligations for a customs union such as the Benelux Economic Union, but also to re-negotiate their tariff agreements with all the other members of the General Agreement on Tariffs and Trade on the basis of a new and joint Benelux tariff of import duties. The 1st January, 1948, the date on which the joint

Benelux tariff came into effect, was also the precise date on which the General Agreement on Tariffs and Trade came into force.[1] It cannot be expected that countries which are forming a customs union will always be presented with such a golden opportunity for making the necessary revisions in their commercial agreements with third countries.

The institution of the joint Benelux tariff also raised a problem of preferential rates of duty. The Benelux Economic Union is intended to be an economic union between three partner countries in respect of their metropolitan European territories ; it is not intended to include the overseas dependent territories of the three partners. The ultimate aim is to ensure complete freedom of movement for goods, men, and capital within the European area comprising Belgium, the Netherlands, and Luxembourg without implying complete freedom of movement between this area and the overseas dependent territories of Belgium and the Netherlands. Nevertheless, the fact that each partner country may have special economic or financial relationships with its own overseas territories may raise complicating issues when the partners form a complete economic union between themselves.

One such issue was raised for the joint Benelux tariff by the question of preferential import duties. Broadly speaking, before the formation of Benelux the Dutch treated their imports from Dutch overseas territories on the same terms as they treated similar imports from third countries ; there were no preferential rates of import duty. Similarly, the Dutch overseas territories treated their imports from the Netherlands on the same terms as imports from third countries. The Belgian arrangements were different. Products from the Belgian Congo were admitted into Belgium duty-free, even if similar products from third countries would have been dutiable. On the other hand, Belgian products sent to the Belgian Congo were subject to the same treatment as goods sent from third countries, since the " open-door " principle of equal treatment for the trade of all countries in the Congo basin was guaranteed under the General Act of Berlin of 1885. Thus the existing position was that the Dutch treated imports from the Dutch overseas territories and from the Belgian Congo on the same terms as imports from any other third country ; but the Belgians admitted goods from the Belgian Congo duty-free, while they treated goods from the Dutch overseas territories on the same terms as goods from any other third country.

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[1] The problem remained unsolved in so far as the Netherlands and Belgium were bound by commercial treaties with countries not represented at the Geneva negotiations. The Benelux countries in fact applied the joint Benelux tariff to all third countries, whether or not they were members of the General agreement on Tariffs and Trade, at the same time declaring themselves ready to negotiate on the basis of the joint Benelux tariff with any country which considered itself hurt by this action. Only Switzerland asked for such negotiations, which resulted at the end of 1948 in the conclusion of a new treaty of commerce between Switzerland and the Benelux countries.

For the common Benelux tariff it was, of course, necessary either that preferential treatment on the Belgian market of the products of the Belgian Congo should be abolished or else that both the Netherlands and Belgium should give the same preferential treatment to the products of both the Dutch and the Belgian overseas territories. The difficulty of the problem was much mitigated by the fact that the type of products (raw materials and foodstuffs) imported from the overseas territories were in any case likely to enjoy free entry or very low duties in the Benelux tariff, whatever their origin might be. The final solution reached was that goods from the overseas territories of both countries on import into any part of the Benelux area could obtain whole or partial exemption from the relevant duties of the common Benelux tariff, such exemptions to be given to the extent determined by the relevant Ministers on the advice of the Benelux Official Council for Customs Regulations.[1] Thus automatic free entry of the products of the Belgian Congo onto the Belgian market has disappeared and has given place to a system of limited and partial preferences for certain products coming from the Dutch as well as the Belgian overseas territories into the Netherlands as well as into Belgium or Luxembourg.

In the arrangements for the institution of the joint Benelux tariff no special provisions were made for the distribution between the three participating governments of the revenue raised by import duties. Each government retained for its own budget the revenue from the duties levied on imports entering the Benelux area through its own customs houses. This is at first sight surprising. In previous customs unions there has normally been some pooling of the customs revenue and its distribution between the participating governments on some more logical principle than the mere geographical position of the port or railway station by which the products happen to have entered the common market. For example, in the Belgium-Luxembourg Economic Union since 1921 revenues from the common customs duties and from the unified excise duties have—with certain exceptions—been pooled and distributed between the governments of the two participating States in proportion to the size of the populations of those States.

The principle that the revenue from the customs should accrue to the government of the country through which the dutiable products first enter the common market has little basic logic and may lead to considerable unfairness, since products might naturally enter one partner country for transport to, and consumption in, another partner country. There is one circumstance which at first sight might seem to make this principle particularly dangerous in its application to Benelux. There is a very great commercial competition between the Belgian port of Antwerp and the Dutch port of Rotterdam ; this acute competition has made the settlement of conditions (port dues, wage rates for dock labour, the construction of harbour facilities and, in particular, of waterways feeding the two harbours) a matter of great concern to, and of considerable dispute between, the governments concerned. Under the existing Benelux system (or lack of system) for the distribution of the revenue from the joint customs the governments might be expected to add a direct budgetary interest to the other commercial considerations which have from time to time heated the controversy between them about the conditions in which the two great ports compete. For it is now true that if products are imported from, say, the United States for consumption in, say, Belgium, the revenue from the relevant Benelux import duty will accrue to the Belgian government if the ship docks in Antwerp but to the Netherlands government if the ship docks in Rotterdam.

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[1] This Council is the permanent committee of senior officials from the three countries which has been set up to supervise, and advise upon, the working of the common customs arrangements.

Nevertheless, the existing system seems to have worked well enough in practice and there is certainly no evidence that it has in fact exacerbated the problem of competition between the Belgian and Dutch ports. The reason for this is that the geographical situation and the transport conditions are such that, broadly speaking, goods for consumption in Belgium are in any case likely to enter through a Belgian port and goods for consumption in the Netherlands through a Dutch port. The acute competition between Belgian and Dutch ports is over transit traffic rather than over imports for consumption in the Benelux countries themselves.

The position is different as regards the revenue from excise duties. It is very probable that in conditions of complete free trade within the Benelux area a dutiable product will be made by one partner country for export to, and consumption in, another partner country. If the rates of excise duty for the product concerned are the same in all the partner countries, there is no need to control the trade in the product at the common frontier in order to see that the rates of tax are adjusted to the rates ruling in the imported partner country. But if the excise duty is levied in the first instance on the production of the product the revenue will all accrue to the government of the country in which the commodity is produced ; none of it will go to the government of the country where it is consumed. If it is desired to distribute the revenue on any basis other than that of the location of the production of the product within the economic union, it will be necessary in some way to pool the revenue from these unified excise taxes in order to distribute it on some other principle.

In Benelux there has not as yet been great success in the final unification of excise duties. In many cases, therefore, a control has had to be maintained at the common frontier between the Netherlands and Belgium. When a product which is subject to excise duty is exported from the Netherlands to Belgium it is exempt from Dutch excise duty on export from the Netherlands but is subject to Belgian excise duty on import into Belgium. But certain excise duties have been unified—

in particular, a Protocol of December, 1947, unified the duties on sparkling fermented drinks, and in this case no tax control is exercised on the common frontier. Nevertheless, the control at the common frontier must even in this case still be maintained for statistical purposes. For by a Convention of February, 1950, it is agreed that the revenue from unified excise duties should be distributed between the governments concerned according to the location of the consumption, and not of the production, of the product. Thus for every product passing from Belgium to the Netherlands on which the excise is unified an account must be kept, so that the Belgian government, which will have received the excise revenue from the production of the product, may be made accountable for this sum to the Dutch government, in whose territory the product is consumed.

Thus the principle of distributing the revenue according to the amount consumed is already in application for the few excise duties which have already been formally unified ; and it was certainly the intention of the governments of the three Benelux countries in the final Benelux Economic Union when all important excise duties, as well as the customs duties, have been unified, to pool the revenue from both sources and to distribute it between the governments of the three countries on some agreed basis.

Quite apart from the system or lack of system on which the revenue is divided between the partner countries, the mere fact that uniform rates of duty are imposed by the partner countries raises an important budgetary problem. A substantial part of the budgetary revenue for each national government is then determined not by the decisions of the particular Minister of Finance and government of each country, but by a common agreement which implies, first, that changes in tax rates can only be made occasionally and with considerable delay since each partner must agree to the change and, second, that if one government is to increase its revenue by raising the relevant rates of tax the revenue of the other partner governments must be increased simultaneously and in the same manner.

This problem which is already an appreciable one in Benelux with the unification of customs duties would become a very serious one if all customs, excise, and turnover taxes were unified. In that case some 50 per cent. of tax revenue (rather more for Belgium and rather less for the Netherlands) would no longer be under the direct control of the Minister of Finance of the country concerned. Suppose there were, for example, a general intensification of world inflationary pressures or a general recession in world economic activity ; and suppose further that the Belgian and Dutch governments wished to react in rather different ways to these situations. For example, the Dutch authorities in a time of recession might wish to stimulate demand by the use of a rapid fiscal instrument, such as a reduction in the rate of turnover tax. But if the Belgian authorities wished to rely on monetary rather than on budgetary policies to maintain equilibrium, the Dutch would be unable to act in this way. In the modern world, the unification of the rates of all the main indirect taxes for the "commercial" purpose of promoting free trade between the partners intensifies, through its effects upon budgetary revenues, the case for an extension of co-operative action into "financial" spheres concerned with the control of inflation, the maintenance of full employment, and the preservation of equilibrium in the balance of payments.

Finally, it may be of interest to point out two administrative implications of the formation of the common Benelux tariff.

In the first place, at the Geneva tariff negotiations in 1947 it was necessary for the three Benelux countries to have a single joint delegation which negotiated the new joint Benelux tariff with the large number of other countries concerned. Separate national delegations were sent to Geneva for the purpose of the rest of the commercial negotiations, that is to say for the negotiation of the general articles concerning quantitative restrictions, subsidies, State trading, and the rest, for inclusion in the Charter of the proposed General Agreement on Tariffs and Trade. But as the Benelux tariff was a completely joint and unified structure, it could be negotiated with other countries only by a single mixed delegation which received a single set of instructions on the basis of agreements reached between the Dutch and the Belgian governments in the Hague and Brussels.

In the second place, in order to make it possible to negotiate changes in the joint Benelux tariff in commercial agreements with other countries without intolerable delays and uncertainties a special parliamentary procedure was devised for each partner country. In the legislation enacted by each of the three parliaments concerned for the ratification of the customs union each government was empowered by its legislature to agree upon, and to put into force, changes in the joint Benelux tariff, only with the obligation to obtain subsequent parliamentary approval of the changes. The duties would be restored to their previous level if the parliament of one of the countries failed to approve the change. It was also thought that some such procedure for facilitating changes in the joint tariff was especially necessary in view of the rapidity with which the final Benelux tariff had to be drawn up and in view of the necessarily experimental nature of so novel a tariff structure.

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Risk and Rank
or Safety First Generalised

By A. D. Roy

I

A complete hypothesis about individual or corporate economic behaviour under uncertainty must specify three things. It must describe the way in which expectations are formed from experience of the hard facts of life, the objectives which the entity under examination is trying to achieve, and the opportunities which present themselves of attaining such ends. The whole corpus of probability and statistical theory represents the sustained efforts of mathematicians and philosophers to provide a rational basis on which expectations may be derived from past events. It is, however, an open question how far the ordinary man or business corporation derives a view of the future in a manner roughly approximating to that of accepted statistical methods. Nevertheless it is a convenient abstraction to assume that the man in the street's attitude is not notably different in kind from that of the practising statistician.

In a recent article[1] I have suggested that a possible and plausible objective of an individual or a corporation is the attainment of the highest possible position in the distribution of income or profit appertaining to the society of which the person or firm is a member. The acceptance of such an aim implies the use of the distribution (or cumulative frequency) function of the expected distribution of income (or profit) as the utility function, the expectation of which is to be maximised. The purpose of the present article is a further pursuit of this scheme of ideas, particularly in relation to the likely set of opportunities with which an economic decision-making body may be confronted. In the course of this exploration the connection between the mode of behaviour now postulated and that which I have elsewhere[2] called Safety First will be demonstrated.

The formal resemblance between the present analysis and that based on the principle of Safety First enables certain methods, developed to expound the implications of the latter principle, to be conveniently adapted to a new purpose. The first task is to fashion the necessary tools and then to illustrate their application to a selection of simple economic problems.

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[1] "On Choosing between Probability Distributions," *Review of Economic Studies*, Vol. XXII, No. 3, 1954–55.

[2] "Safety First and the Holding of Assets", *Econometrica*, Vol. XX, No. 3, July 1952.

II

For the first stage of the analysis it is convenient to identify ourselves with a hypothetical person about to take a decision in face of the kind of uncertainty which can reasonably be described in terms of probability distributions. Let us imagine that each one of a number of possible actions which we can take today determines the probability distribution of our income next year. In other words, we have to choose between a set of probability distributions of future income.

We have in our mind's eye a reasonably clear picture of what the income distribution is likely to be next year in the society in which we live. This picture is in fact so clear that we can say for each level of next year's income the proportion of the members of society who will be likely to enjoy an income less than this level. Our aim is to ensure that on the average we achieve the highest possible position in society next year. As has been mentioned before, this is formally equivalent to maximising a utility function of income, the value of which for each level of income is equal to the proportion of members of society who will have an income smaller than this value.

The same objective can, however, be described in another way, which is more helpful so far as our present purpose is concerned. Suppose we have selected a particular probability distribution of future income and suppose also that another member of our society has been selected at random. Then the chance that this randomly chosen man's income next year is less than our future income can easily be calculated. To achieve the objective of the highest position in the future income distribution, we should choose that distribution of our future income which makes this chance as large as possible.

The last statement ought to make clear the resemblance between action under uncertainty based on the principle of Safety First and that motivated by the pursuit of social eminence. In the former case we try to maximise the chance that our future income exceeds a fixed "disaster" value, while here the "disaster" value is itself a random variable, namely the income next year of a chance social acquaintance.

We can now relax some of the more implausible assumptions about our knowledge of the future. We are most unlikely to have precise information about the form of the possible probability distributions of our future income or about the exact shape of society's future income distribution. Suppose that we can only characterise both kinds of distribution by two measures or parameters. Each action that we might take leads to a particular mean or expected income and to a standard error which measures the dispersion of possible incomes about the expected value. As with our future income, so also with the income distribution of society; we have a shrewd idea of the average income that a member of our society will enjoy next year and we are prepared also to think of a number which will measure the dispersion or scatter of next year's income distribution. But beyond this, we cannot and—wisely—will not attempt to go.

This restriction on our ability to peer into the future even in a strictly non-deterministic sense prevents us from calculating precisely the chance that our income will exceed that of a randomly selected member of society. It does not, however, prevent us from establishing either an upper or a lower bound to this chance. An appeal to the well known statistical inequality due to Tchebychef suggests that in these circumstances the proper course to adopt is to maximise the ratio of the expected difference between our future income and the income of a man chosen at random to the standard deviation (or dispersion) of this difference. If it happened that all the relevant distributions were of Normal or Gaussian form, this course of action would in fact maximise the chance that our future income exceeds that of a randomly selected member of society. But as we are ignorant of the form of these distributions the maximisation of the ratio previously mentioned is the best that can be done and there exists no other procedure that is better calculated to achieve our ends.

Fortunately it is possible to represent the necessary maximising process in a very simple geometrical form. For each possible probability distribution of next year's income that we can choose, we have already equipped ourselves with a knowledge of expected income and a measure of the dispersion of the distribution. We can, therefore, derive the standard deviation of the distribution of the difference between our future income and that of a randomly chosen member of society. Each opportunity confronting us can thus be represented by two measures; one is the standard deviation of this difference and the other is the expected future income. For the whole set of opportunities facing us, these measures can be plotted pair by pair on a two-dimensional diagram. The standard deviation of the difference between our income and that of society's representative is measured along the horizontal axis and our expected income along the vertical axis. Normally there will exist a curve which bounds the set of points representing the opportunities open to us. The process of choice previously described consists of plotting on the vertical axis a point, the distance of which from the origin is equal to the average income next year of the members of society. From this point is dropped the steeper tangent to the curve bounding our set of opportunities. The point where this tangent touches the boundary curve is the opportunity, the seizure of which is best calculated to assure us of a rapid ascent of the social ladder.

The process of selection of the most favourable probability distribution of our future income is shown in Figure 1.

The convenience of this particular mode of geometrical presentation is dependent upon the good behaviour from an analytical point of view of the curve bounding our set of opportunities. In the examples which

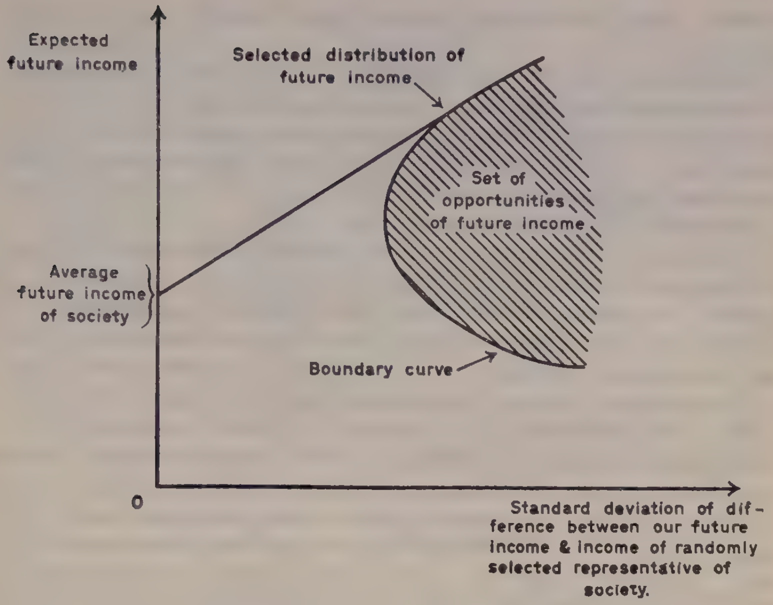
Expected future income
Selected distribution of future income
Set of opportunities of future income
Average future income of society
Boundary curve
0
Standard deviation of difference between our future income & income of randomly selected representative of society.

Fig. 1

will be discussed later on, it is found that this curve consists of arcs of hyperbolæ of quite tractable form.

The apparatus has now been erected and the next step is to put it into action in the analysis of two simple types of problem. The first problem is concerned with the allocation of the total resources of an individual and the second problem only involves the allocation of marginal resources.

III

The first problem has a faintly agricultural setting. We own a farm of a given size and on the land we can grow only two kinds of crop. There are, however, no technical restrictions on the proportions of the two crops that we must grow.

We have a good idea of the profit margins per acre that we may expect from each crop and also of the relative margins of uncertainty attaching to our forecasts of these profits. We can also forecast the average profit of the farmers in our district and the scatter of these profits.

In these circumstances we shall find it desirable to modify to some extent the conventions of Figure 1. In Figure 2 we shall measure along the horizontal axis the standard deviation of the difference between our profit per acre and the profit per acre required on a holding of our size to achieve the profit gained by a local farmer selected at random. Along the vertical axis we shall measure expected profit per acre.

We ought to allow for the possibility that we shall find it desirable to leave some of our land idle. In fact, however, such a course is only desirable if we expect the average farmer in our part of the country to make a loss. Thus in order to keep the diagram simple we shall assume for present purposes that all our land is used. There is no difficulty in practice in dealing with idle resources.

The form of our opportunity curve depends on the extent to which we expect movements in the two profit margins to be associated. In Figure 2 we show the curve on three different assumptions; the margins may move together in the same or opposite directions or they may be completely unassociated. Again there is no obstacle to assuming any particular degree of association between the profit margins.

The best combination of crop acreages is found by plotting on the vertical axis a point, the distance of which from the origin is equal to the yield per acre which we should have to achieve in order to earn as much profit as the average farmer in our neighbourhood. The steeper tangent from this point is then dropped on to our opportunity curve. Figure 2 shows the results of this process and distinguishes two different possibilities. The standard error of the higher profit margin may be either greater or less than the standard error of the lower profit margin.

In both diagrams the point A represents the situation when we devote our entire holding to the crop which is expected to yield the higher

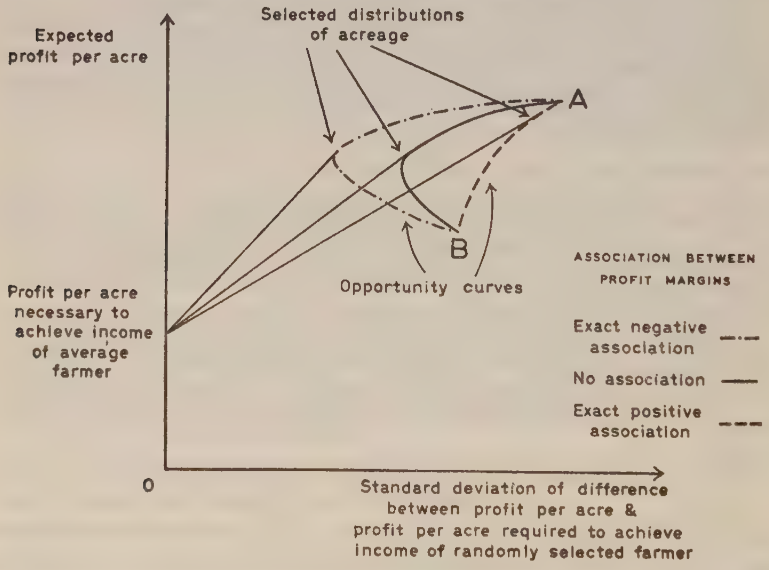
Expected profit per acre
Selected distributions of acreage
A
B
Opportunity curves
Profit per acre necessary to achieve income of average farmer
0
Standard deviation of difference between profit per acre & profit per acre required to achieve income of randomly selected farmer
ASSOCIATION BETWEEN PROFIT MARGINS
Exact negative association —·—
No association ——
Exact positive association – – –

Fig. 2(a)

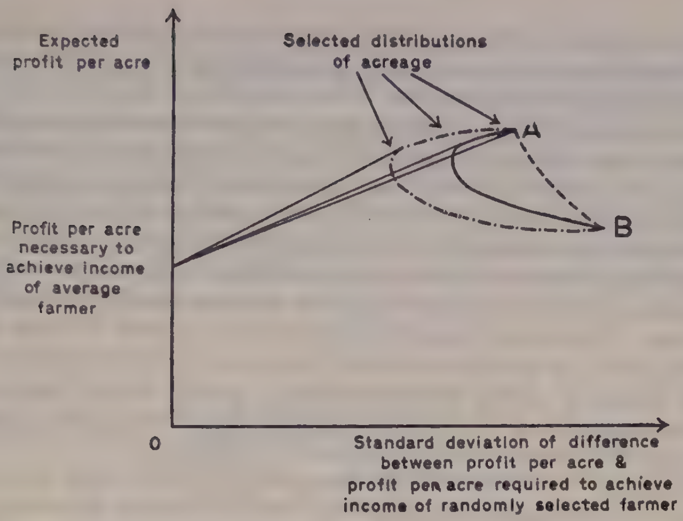
Expected profit per acre
Selected distributions of acreage
A
B
Profit per acre necessary to achieve income of average farmer
0
Standard deviation of difference between profit per acre & profit per acre required to achieve income of randomly selected farmer

Fig. 2 (b)

profit per acre. As we decrease the acreage of this crop and increase the acreage of the other crop we move along the arc of the hyperbola until we reach B, where we have switched over completely to the crop with the lower expected profit per acre.

How does the picture change as we vary the total acreage of our holding ? The points A and B do not change their height but as the size of acreage is increased the opportunity curve is displaced towards the vertical axis. Simultaneously the profit per acre necessary to achieve the income of the average farmer is reduced, and the point representing this profit will move nearer to the origin.

Thus it follows that the larger is the holding the more shall we seek to minimise the uncertainty attaching to next year's profit and the more shall we diversify our crops by putting an increasing proportion of our total acreage under the crop which is expected to be the less profitable. The smaller is our size of holding the greater will be the proportion that we devote to the more profitable crop, until a certain limiting size of holding is reached at which it is desirable to grow only the more profitable crop. In the situation portrayed in Figure 2(a), there remains no more to be said. But if the uncertainty attaching to the less profitable crop is greater than the uncertainty of the more profitable crop, then an inspection of Figure 2(b) shows that if we continue to reduce the size of holding it will eventually become desirable to switch over completely from the more profitable crop to the less profitable one. For the profit per acre required to achieve the income of the average farmer will become so large that the steeper[1] tangent from the point representing this profit will pass through the point B and not A. In other words, if our holding is small, slight chances of big profits are sufficient to lure us into specialising on a crop, the expected profit on which is relatively low.

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[1] Steeper here means the steeper *upwards* or the less steep *downwards.*

The diagrams of Figure 2 could have been drawn showing a negative expected profit on the less profitable crop. In this situation it would still have been true that with a largish holding of land we should have found it desirable to grow some of the less profitable crop. The growing of this crop, considered in isolation, is a clear gamble but the fact remains that when it is grown in combination with another crop it may make our future position in society more secure than it otherwise could be. This simple illustration shows that it is rash to draw conclusions about the marginal utility of income from the observation that people appear to insure themselves and to gamble at the same time. The important thing to investigate is the effect of both these actions taken together on an individual's total risk situation.

This simple quasi-agricultural example has shown that on quite plausible assumptions, both the diversification of crops and complete specialisation are optimal policies but in different circumstances. The greatest degree of diversification is desirable for large landowners, and specialisation is indicated for small holders. The smallest holders of all should specialise on the risky crops if they wish to have a reasonable chance, which may inevitably be small, of rising in the world.

IV

For the second example we imagine that we have just acquired a certain sum of money, which for reasons that we shall not discuss we have decided not to spend on consumer goods. We expect to receive from our normal sources a substantial income next year but we cannot be precisely sure what this income will be. If we invest our windfall in gilt-edged securities we shall be certain to earn a given rate of interest. If we buy equities we can expect a somewhat higher yield but this is subject to a degree of uncertainty. Our bank is prepared to give us an overdraft[1] within certain definite limits for which facility a fixed interest charge will be levied. As before, our primary aim is the ascent of the income distribution. How should we act in order to further this objective ?

The diagram required must once again be a further modification of Figure 1. Along the horizontal axis we measure the standard deviation of the difference between the yield on our investment and the yield required to enable our total income to equal that of a member of society selected at random. On the vertical axis we measure the expected yield on the sum of money available for investment. For the purpose of exposition we shall assume that our income from other sources is not associated with movements in the yield on equities, but this assumption could easily be avoided if necessary.

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[1] This was written before the intensification of the credit squeeze.

On the vertical axis we plot a point at a distance from the origin equal to the yield on our investment necessary to bring our expected income from all sources to equality with the income of the average member of the community of which we are a member. This point may clearly lie above or below the origin according as to whether we expect our income from other sources to lie below or above the average income of society. From this point we drop the steeper tangent to the curve representing the various opportunities, and the point of contact of this tangent indicates the selected investment opportunity.

Figure 3 shows the results of this process.

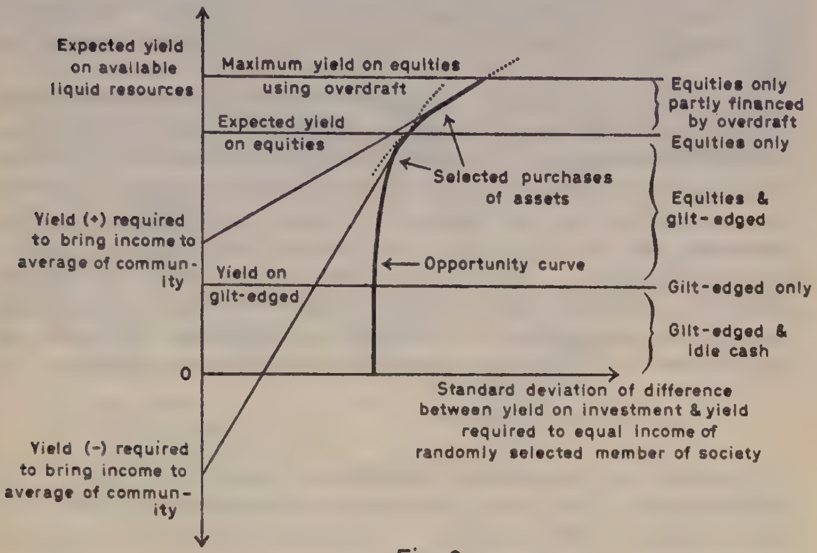
Expected yield on available liquid resources
Maximum yield on equities using overdraft
Expected yield on equities
Yield (+) required to bring income to average of community
Yield on gilt-edged
0
Yield (−) required to bring income to average of community
Selected purchases of assets
Opportunity curve
Equities only partly financed by overdraft
Equities only
Equities & gilt-edged
Gilt-edged only
Gilt-edged & idle cash
Standard deviation of difference between yield on investment & yield required to equal income of randomly selected member of society

Fig. 3

The diagram shows that if our expected income next year is small, the yield required to bring our total income up to the average of society will be large and we shall buy equities up to the limit of our overdraft facilities. With a larger income we shall progressively reduce our reliance on an overdraft. Owing to the kink in the opportunity curve, there will be a range of incomes for which we shall buy equities only. For larger incomes still as we move into the upper portion of the income distribution we shall buy both equities and gilt-edged securities and we shall switch more and more to gilt-edged as our income increases.

Under the conditions postulated, at no income should we wish to hold any of our cash idle. If, however, we introduced an element of uncertainty into the yield on gilt-edged securities, this would cause the lower section of the opportunity curve to bend slightly to the right. Thus with a sufficiently large income, we should desire to hold a proportion of our funds in completely liquid form. The greater the uncertainty attaching to the rate of interest the more should we attempt to escape this uncertainty by holding cash balances.

Provided that we are sufficiently rich or have sufficient liquid resources to include both gilt-edged securities and equities in our portfolio, we shall be the more enterprising the greater the dispersion of the future income distribution or the greater our uncertainty about our income from other sources. For the greater is the dispersion of the income distribution the larger is the increment of income required to move us up a given number of places in the distribution. While the more uncertain we are about our income from other sources, the more attractive are the relatively larger prizes that equity dividends may bring us as compensations for an otherwise unprosperous year. In Figure 3 both changes are represented by a shift of the opportunity curve to the right.

This example was mainly designed to show the ease with which the present tool of analysis can be adapted to an examination of a problem concerning the allocation of marginal resources. It has served also to show how the desire to hold more risky assets may vary with our position in the income distribution and with the relative confidence with which we regard our normal income-earning opportunities in the future. The apparent desire of the poor to buy equities should not, however, be taken too seriously. We have not allowed them here to contemplate the possibility of dissipating their cash on football pools or in the more speculative private business ventures.

V

It remains to discuss briefly two further topics. The first is the generalisation of the scheme of analysis to the optimal selection of a large number of different assets. The second is the effect of taxation on our actions in the face of uncertainty.

Suppose that we are faced with a large number of different assets which we can purchase and which collectively will furnish us with our future income. If our resources are small, we shall tend to be a one-asset man and the problem is not of any considerable analytical interest. We shall assume then that we have sufficient resources to make some degree of diversification desirable. Formally the problem is a fairly simple generalisation of the diversification of assets on the principle of Safety First.[1] Here, however, we shall confine ourselves to an interpretation of the results of a mathematical analysis.

The first step is to calculate what may be called the *critical yield*. We forecast the safest possible income which could be achieved by an appropriate diversification of the assets available to us and we calculate the standard error of this forecast income. The critical yield is then the weighted average of this income and the average income of society

[1] See mathematical appendix to " Safety First and the Holding of Assets ", *Econometrica*, Vol. XX, No. 3, July 1952.

(the respective weights being inversely proportional to the squares of the standard error of the safest income and the dispersion of the expected income distribution) divided by the total amount of our resources.

We then forecast what the yield of each asset is likely to be if every other asset's yield were equal to the critical yield. In statistical terms we use the regression of each asset's yield on the yields of all the other assets. The difference between this forecast yield and the critical yield is then divided by the square of the standard error of the forecast yield and the figure obtained is the " mark " allotted to the particular asset under examination. Our total resources are then allotted to the purchase of each asset in proportion to the marks attributed to it.

From an analytical point of view difficulties arise if all or any of the assets can be held only in positive amounts.[1] However, these problems may be resolved geometrically with comparative simplicity as the following diagram illustrates. We are now considering three assets none of which can be held in negative amounts, i.e. as liabilities.

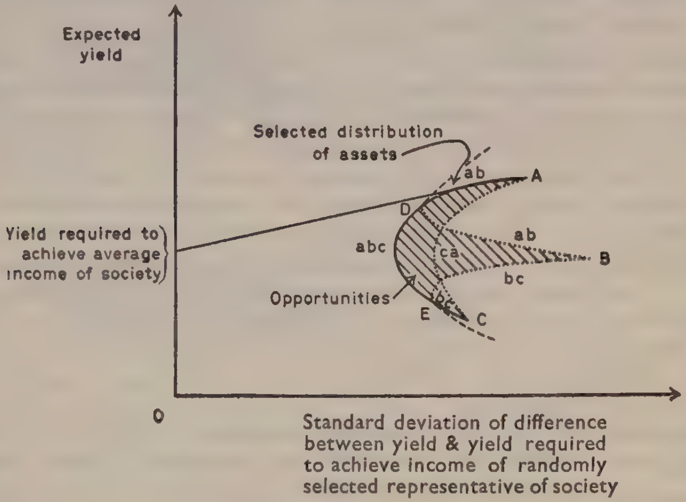
Expected yield
Selected distribution of assets
ab
A
D
Yield required to achieve average income of society
abc
ca
ab
B
bc
Opportunities
E
C
0
Standard deviation of difference between yield & yield required to achieve income of randomly selected representative of society

Fig. 3

The diagram represents the situation when we are confronted with three kinds of assets. The points A, B and C correspond to the state of affairs when each of these assets is held singly. The curves ab, bc, and ca represent our opportunities when our portfolio consists of two assets only. The curve abc is the outer boundary of our set of opportunities when three assets are held and this curve touches the curves ab and bc at D and E respectively.

If we are relatively well-to-do we hold some of all three assets. As our total resources are reduced we increase our proportionate holding of the most profitable asset and reduce our proportionate holding of the others until at the point D we hold none of the least profitable asset. A further reduction in our resources increases our relative dependence on the most profitable asset until we hold that alone. A sufficient further diminution in our wealth will cause us to hold the second most profitable asset, but under the circumstances portrayed in Figure 4 we shall never hold the least profitable asset alone.

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[1] If an asset is allotted a negative " mark ", this is an instruction to contract liabilities in the form of this asset.

Mr. Egerton in a recent article[1] has suggested that Professor Shackle's discussion[2] of asset holding implicitly assumes an exact positive association between the yields of each pair of assets. On such an assumption, the opportunities shown in Figure 4 assume the limiting shape illustrated in Figure 5.

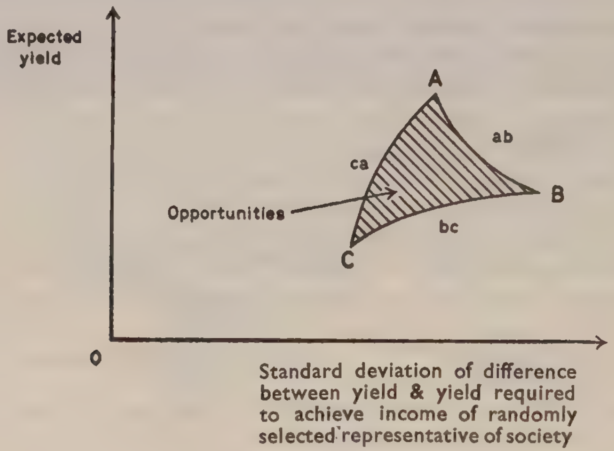
Expected yield
A
ab
ca
B
Opportunities
bc
C
0
Standard deviation of difference between yield & yield required to achieve income of randomly selected representative of society

Fig. 5

With an exact positive association between each pair of yields, it will never be desirable to hold more than two assets at once, whatever the number of assets between which we can choose. This is precisely the conclusion which Professor Shackle reached in his analysis of the problem.

Apart from the coincidence of the present analysis in a rather special case with Professor Shackle's finding, the interest of the extension of the discussion to more than two assets lies in the way in which the opportunity curve is built up. In the case of three assets this process is shown in Figure 4 and there is little difficulty in generalising the scheme to any number of assets. At all times the boundary of the set of opportunities remains a curve, and does not become a surface, whatever the number of assets involved. Thus the desire to obtain greater generality does not force us into an impossible number of dimensions, and the geometrical approach remains valid for a problem of any degree of complexity.

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[1] R. A. D. Egerton, " The Holding of Assets : ' Gambler Preference ' or Safety First ", Oxford Economic Papers (New Series), Vol. 8, No. 1, February 1956.

[2] G. L. S. Shackle *Expectation in Economics*, 2nd Edition, Cambridge University Press, 1952.

VI

Now for taxation. If an income tax is levied, then our aim may well be modified to the extent that we shall wish to reach the highest position in the post-tax income distribution of society rather than in the pre-tax distribution. If we know the precise form of all relevant probability distributions of future income and of society's expected income distribution, then provided that the tax structure does not discriminate against particular classes of people or against particular sources of income but depends on total income alone, we shall achieve the highest relative position in the pre- and post-tax distributions by precisely the same means. Thus, with full information in the sense described above, the imposition of or a change in income tax is neutral in its effects on our willingness to bear risk.

As we have already said, it is unlikely that we shall conceive of ourselves as being so fully informed. The ratio of the expected difference between our future income and the income of a man selected at random to the standard deviation of this difference only remains unchanged if the rate of tax on marginal income is the same for all income. Thus it is unlikely that a change in tax rates will be neutral in its effects on our risk-bearing proclivities. We cannot, however, predict the effects of an increase in tax rates unless we specify precisely how we shall attempt to calculate the net yields of the various assets that we can hold and the mean and scatter of the future distribution of post-tax income.

However, in so far as an increase in income tax produces a less skew distribution of post-tax income, so will we be able to make better use of our limited information to reach the higher rungs of society. For the nearer Normality the post-tax income distribution becomes, the more efficient will be the maximisation of the ratio of the expected difference between our future income and the income of a man selected at random to the standard deviation of this difference as a means of achieving the highest average position in the income distribution.

VII

The purpose of this paper has been to present in simple terms a description of a tool for analysing behaviour under uncertainty. There has been no attempt to apply this tool to anything other than simple illustrative problems, but perhaps it may prove to be of use to those who are struggling with more rewarding analyses. Until it has proved itself in this way, emphasis must be placed on the advantages that it possesses :—

(*a*) The basic premise of a desire to rise in the world is of great simplicity.

(*b*) The character of behaviour postulated is competitive in the sense that what other people will achieve—at least in the mass—is taken into account.

(*c*) The tool can be applied to a great variety of problems. The society of which an individual is a member and the variable on which his prestige depends can be re-defined from problem to problem.

(*d*) The diagrammatic representation of the analysis is *always* two-dimensional. In a science where diagrams are legitimate devices but symbols are often taboo, this is a strong recommendation.

(*e*) The method of analysis is capable of explaining a great variety of behaviour.

Its most notable disadvantage, which it shares with every other attack on problems of uncertainty, is that it cannot be tested in a strictly quantitative sense until a satisfactory hypothesis about how expectations are formed is eventually framed. Until this happens, the present analysis must be judged on its ability to increase our understanding of the factors which govern the mysterious process of decision-making in the face of uncertainty.

MATHEMATICAL APPENDIX

1. Suppose that the frequency distribution of our next year's income is given by

$$g\,(y,\,c),$$

where y is next year's income and c is a parameter.[1]

Suppose further that $F(y)$ is the distribution function of the next year's income distribution. Then to achieve the highest position on the average in the next year's income distribution, we must maximise

$$\int_{-\infty}^{\infty} g(y,\,c)\,F(y)\,dy$$

for variations in c.

If Y is the income of an individual chosen at random from next year's income distribution, then

$$\int_{-\infty}^{\infty} g(y,\,c)\,F(y)\,dy = \text{Prob}\,(y \geqq Y)$$

2. If $\left\{\begin{array}{l} \mathrm{E}(y/c) = h(c) \\ \mathrm{Var}(y/c) = \tau^2(c) \end{array}\right\}$ and $\left\{\begin{array}{l} E\,(Y) = m \\ \text{var } Y = \sigma^2 \end{array}\right\}$,

then by Tchebychef's inequality

$$\text{Prob}\,(y > Y) \geqq 1 - \frac{\sigma^2 + \tau^2\,(c)}{\{h(c) - m\}^2} \text{ if } h(c) > m,$$

$$\text{Prob}\,(y \geqq Y) \leqq \frac{\sigma^2 + \tau^2\,(c)}{\{m - h(c)\}^2} \text{ if } h(c) < m.$$

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[1] Or a vector of parameters.

In both cases it appears desirable to maximise

$$\frac{h(c) - m}{\sqrt{\sigma^2 + \tau^2(c)}}$$

for variations in c.

3. Suppose that there are n assets with expected yields per pound sterling of purchase price of l_i $(i=1, 2,..n)$ and standard errors of yield α_i $(i=1, 2,..n)$.

Denote by a the column vector $\left\{\frac{l_1}{\alpha_1}, \frac{l_2}{\alpha_2}, \dots, \frac{l_n}{\alpha_n}\right\}$,

and by b the column vector $\left\{\frac{1}{\alpha_1}, \frac{1}{\alpha_2}, \dots, \frac{1}{\alpha_n}\right\}$.

Let W be the matrix of correlations between the yields of each pair of assets and let k be total resources in pounds sterling.

Suppose we spend an amount x_i on the i–*th* asset, then if we write y for the column vector $(x_1\,\alpha_1, x_2\,\alpha_2, \dots, x_n\,\alpha_n)$,

we have

$$\begin{aligned} h &= y'a \\ \tau^2 &= y'Wy \\ k &= y'b \end{aligned}$$

and it is required to choose the y's so as to maximise $\frac{h-m}{\sqrt{\sigma^2+\tau^2}}$.

Let us write $z^2 = \sigma^2 + \tau^2$; then the envelope of the possible pairs of values of (z, h), assuming no restriction on the possible values of the x's, is given by the branch of the hyperbola

$$\begin{vmatrix} z^2 - \sigma^2 & h & k \\ h & a'W^{-1}a & a'W^{-1}b \\ k & a'W^{-1}b & b'W^{-1}b \end{vmatrix} = 0$$

which lies in the first and second quadrants.

4. The tangent from the point (o, m) touches the hyperbola where

$$y = \frac{kW^{-1}(ka - mb) + \sigma^2 W^{-1}\{(b'W^{-1}b)\,a - (b'W^{-1}a)\,b\}}{(ka - mb)'\,W^{-1}\,b.}$$

$$= \frac{k\left\{1 + \sigma^2 . \; \frac{b'W^{-1}b}{k^2}\right\}}{\left[a - \left(\frac{m}{k}\right) b\right]' W^{-1} b} \left[W^{-1} \left\{ a - \frac{b}{k} . \frac{\left(\frac{m}{\sigma^2} + \frac{k . b'W^{-1}a}{b'W^{-1}b} \cdot \frac{b'W^{-1}b}{k^2}\right)}{\left(\frac{1}{\sigma^2} + \frac{b'W^{-1}b}{k^2}\right)} \right\} \right]$$

Thus $y \propto W^{-1}\left\{a - \frac{b}{k}\cdot\frac{\left(\frac{m}{\sigma^2}+\frac{k\,.\,b'W^{-1}a}{b'W^{-1}b}\cdot\frac{b'W^{-1}b}{k^2}\right)}{\left(\frac{1}{\sigma^2}+\frac{b'W^{-1}b}{k^2}\right)}\right\}$

where the safest attainable income has expectation $k\,.\,\frac{b'W^{-1}a}{b'W^{-1}b}$ and standard error $\frac{k}{\sqrt{b'W^{-1}b}}$.

The values of the x's can thus be easily deduced.

5. The maximum value attained by $\frac{h-m}{\sqrt{\sigma^2+\tau^2}}$ is equal to

$$\sqrt{-\frac{\begin{vmatrix} -\sigma^2 & m & k \\ m & a'W^{-1}a & b'W^{-1}a \\ k & b'W^{-1}a & b'W^{-1}b \end{vmatrix}}{k^2+\sigma^2\, b'W^{-1}b}}$$

Sidney Sussex College, Cambridge.

Inflation and Deflation in 1694–1696

By J. K. Horsefield

> " When two men cannot agree over the price of an onion, who shall decide what happened in the time of Yu ? "
>
> —*Kai Lung's Golden Hours.*

Chapter VI of *The Pound Sterling*,[1] which deals with the foundation of the Bank of England and the Recoinage of 1696, is headed " The First Credit Inflation ". In it, Feavearyear refers to the beneficial effect upon Government financial operations in 1694–5 of the " considerable measure of credit inflation " produced by the initial issue of Bank of England notes,[2] and attributes to this the rises in the price of silver, the value of the guinea, and the foreign exchange rates, in 1694–5.[3] In this, as he himself points out, he was following the Bullion Report.[4]

A rather different account is given by Scott in his *Joint-Stock Companies to 1720.* Referring to the situation in 1695, he says that " Any inflation, that there may have been in 1694, was gradually reduced by the growing stringency of the money-market; and, by the summer of 1695, there were the premonitory symptoms of the beginning of a crisis ".[5]

More recently, a third interpretation has been placed upon these events by Mr. Ming-Hsun Li, in his unpublished thesis, *The Great Recoinage of 1696–99.*[6] In this he asserts that until September or October, 1695, " general prices were falling " ; their subsequent rise " was due to four special causes which had nothing to do with inflation ", viz.:—

(i) a partial failure of crops;
(ii) an increased velocity of circulation of the silver coins due to the imminence of their demonetisation;
(iii) increased purchases by holders of guineas following their increase in value;
(iv) a rise in the price of imports and exports due to a fall in the exchange value of sterling; which in turn was due to remittances in connection with the war, and to capital flight.[7]

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[1] A. E. Feavearyear: *The Pound Sterling*, London, 1931, pp. 109–137.

[2] Pp. 117, 119.

[3] Pp. 119, 125. Silver rose above 5s. 3d. an ounce at the end of August, 1694, and guineas above 22s. in November, 1694.

[4] P. 125n. *Report from the Select Committee on the High Price of Bullion* (1810), Cannan's edition, pp. 38, 39.

[5] W. R. Scott: *Joint Stock Companies to 1720*, Vol. I, Cambridge, 1912, p. 347.

[6] Ph.D., University of London, 1940.

[7] *Op. cit.*, pp. 90–96.

Clapham sums up this view by saying that " Mr. Li argues that there was no true inflation ".[1]

To some extent the difference of view revealed may be a matter merely of semantics. Even if increases of prices due to bad harvests or to changes in the terms of trade (Mr. Li's first and fourth points) are not regarded as symptomatic of an inflation, it seems somewhat curious to refuse to regard as a " true inflation " a situation in which prices were rising because the velocity of circulation of money, or the purchasing-power of individual coins, had increased (his second and third points).

But even if allowance is made for this terminological difference, a substantial discrepancy remains between the three views summarised. Feavearyear implies that inflation began as soon as the Bank of England started operations—i.e. in mid-1694—and continued through 1695; Scott accepts that it started in 1694, but believes it was " reduced " in 1695; Mr. Li denies that any symptoms of inflation, however explained, developed before the autumn of 1695.

The purpose of this article is to examine the situation which has given rise to these opposing interpretations, and to seek to discover what did in fact happen.

I

Contemporaries certainly thought that prices were rising in 1695; the literature is full of complaints about them. One example, from a sober observer, will suffice. William Lowndes, writing between May and September, 1695, blamed the bad state of the coins for " Raising the Price not only of Merchandizes, but even of Edibles, and other Necessaries for the sustenance of the Common People, to their great Grievance ".[2] But this belief is not borne out unambiguously, either as to the fact or to the cause, by surviving records of prices in the period.

There are two sets of sources to be considered. We may refer first to the extensive collection of data available in the published volume of English prices collected under the ægis of the International Scientific Committee on Price History.[3] This has the advantage of providing continuous series for a number of years before and after 1694–6. On the other hand, the vast bulk of the data is in the form of annual averages for " Harvest Years ", beginning about Michaelmas in each year,[4] so that it is not directly helpful for shorter periods than a year.

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[1] J. H. Clapham: *The Bank of England*: *A History*, Cambridge, 1944, p. 45, n. 3.

[2] *A Report containing an Essay for the Amendment of the Silver Coins.* Reprinted in McCulloch: *A Select Collection of Scarce and Valuable Tracts on Money* (1856 and 1933), p. 233. The Report was commissioned in May, 1695 (Feavearyear: *op. cit.*, p. 122) and is dated September 12, 1695.

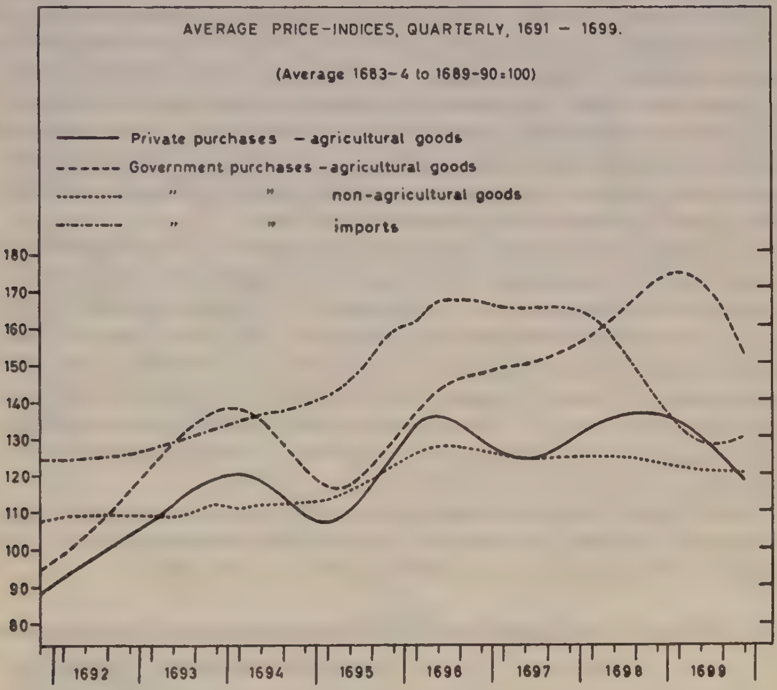
[3] Beveridge and Others: *Prices and Wages in England*, Vol. I, London, 1939.

[4] There are no monthly data for 1694–6. Quarterly figures are available only for wheat, malt and bread.

However, a good idea of the general run of prices can be obtained from this source. Complete series from 1683 to 1700 are available from which annual price-indices (albeit unweighted) can be calculated: (1) for Government purchases of (*a*) domestic agricultural goods (9 items); (*b*) domestic non-agricultural goods (18 items); and (*c*) imports (13 items); and (2) for private purchases of agricultural goods (9 items, of which 7 are the same as 7 amongst the 9 Government purchases).

In order to permit of readier comparison with calendar year periods, quarterly data have here been interpolated by a method, described in the Appendix, which irons out random fluctuations within each year, including seasonal fluctuations. Chart I shows the resulting curves for the four classes of commodities mentioned, for the period 1691 (4th quarter) through 1699, on the base of the average prices for each class in 1683–90.

Chart I



It is clear from the Chart that the prices of imports rose much more than those of domestic products up to the end of the war (September, 1697). No doubt the difficulties of international trade during the war, coupled with the urgent military need for many of the imports, sufficiently explains this discrepancy.

As regards domestic products, it will be noticed that the general shape of the two curves for agricultural prices is extremely similar except from the second quarter of 1696 until the second quarter of 1697, during which period prices fell for private purchases, but rose for those of the Government. For all parties, agricultural prices fluctuated throughout the decade, and were higher in the second quinquennium than in the first. Both the long-run trend and the short-run changes are easily explained by the succession of bad harvests after 1691 recorded by Tooke.[1] We are obliged, therefore, to conclude that the movement of agricultural prices alone, within any short period such as 1694–1696, cannot offer a satisfactory pointer to the presence or absence of a monetary inflation.

Unfortunately the only non-agricultural goods for which records of private purchases are available are coal and candles, which do not provide sufficient data for study. In effect, therefore, we have, so far as *Prices and Wages in England* is concerned, non-agricultural price data for this period for Government purchases only. And these are somewhat suspect, since the discrepancy between the two curves for agricultural products suggests that some special influence affected Government purchases more than private ones.

To examine the prices of private purchases of non-agricultural goods, and to obtain data from month to month, we may turn to Houghton's *Collection for Improvement of Husbandry and Trade*. These give weekly quotations from December, 1692, for a large range of commodities, varying slightly from time to time. For 1694–6 complete series are available for 22 non-agricultural products, which seem to have been of domestic origin. These commodities are listed in the Appendix. Since Houghton's quotations are market ones, it may be assumed that they referred to private, not Government, purchases.

Table 1 gives half-yearly figures derived from an unweighted average of monthly indices for these 22 commodities, calculated on a base 1695 = 100. The data are plotted monthly on Chart II.

TABLE 1

Half-Year	Average Index	Change on Previous H-Y
1694 January—June	100·4	—
July—December	96·3	−4%
1695 January—June	96·8	—
July—December	103·2	+ 7%
1696 January—June	110·4	+ 7%
July—December	102·4	−7%

Chart I had suggested a tendency for prices of non-agricultural commodities to move upwards in 1695 and the first half of 1696.

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[1] Tooke and Newmarch: *A History of Prices . . .*, Vol. I (1838), pp. 30–34.

Chart II, on a larger scale, confirms this, and identifies the period of the rise as lying between July, 1695, and April, 1696. (The unsustained upward movement in April and May, 1695, was due solely to a temporary very sharp rise in the price of coal.) During these ten months the index rose from 96·2 (June, 1695) to 113·8 (April, 1696), an increase of nearly 18 per cent.

Chart II

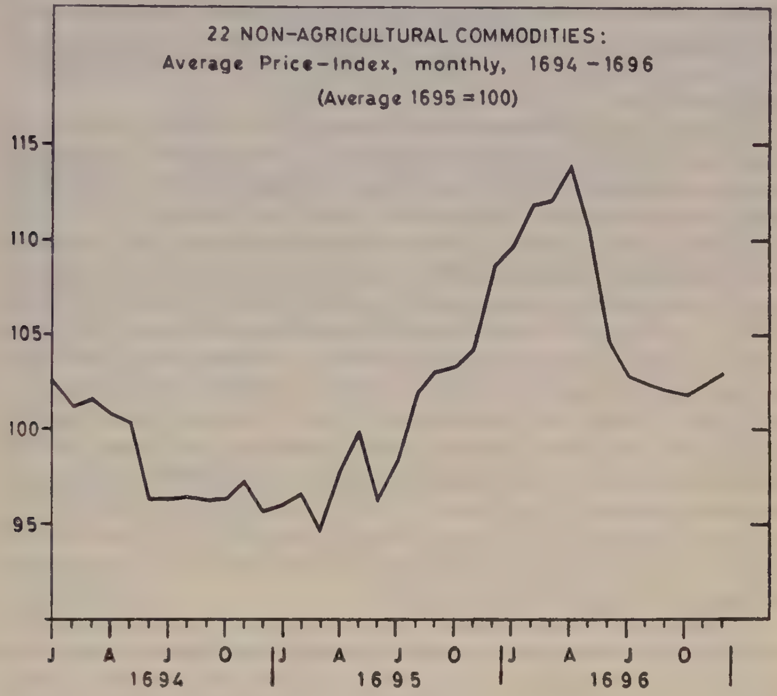

Chart I also shows that, even for Government purchases, non-agricultural prices—though higher than the average of the seven years 1683–90—were fairly constant from 1691 to 1694 and again from 1697 to 1699. The increase in 1695–6 appears, therefore, to have been an isolated phenomenon. This evidence is certainly not inconsistent, to put it no higher, with a monetary inflation having existed in 1695–6. Can anything be discovered about the variations in the money supply which might support this hypothesis ?

II

That fiscal conditions conducive to an inflation existed in 1695 is certain. War with France had been in progress since 1689, and the Government debt was rising rapidly. At Michaelmas 1694 it stood at about £6·6 million. In the ensuing twelve months it increased by £2 million, and in 1695–6 by £3 million.[1] Towards this, the Bank of England had by December, 1694, lent £1·2 million, against only £720,000 called up. On the other hand, as Scott pointed out, the shortage of commercial capital, following the activity in the capital market since 1692, caused acute stringency in that field in 1695. Moreover, the Continental expenses of the war, and some interruption of normal exports, seem to have produced something of an import surplus, financed by exports of bullion. The latter was itself partly fed by melting down the heavier-weight silver coins, though how far these were drawn from circulation and how far from hoards is uncertain.

This last factor interacted with a number of others to make the monetary situation extremely complex. Furthermore, it changed rapidly and extensively in 1694 and the two following years. In the first place, about two-thirds of the silver coins in existence in 1694 were hammered money which had been extensively clipped. In December, 1695, Parliament decided that these must all be recoined,[2] and that they should be demonetised progressively by April 2 (later extended to May 4), 1696.[3] Secondly, the price of silver bullion rose above par late in 1694, and did not recover until mid-1696.[4] Because of this, the milled and other full-weight coins, even if not exported, were increasingly hoarded. Thirdly, the recoinage was slow in getting started, and no appreciable volume of the new coins emerged until late in 1696. Fourthly, the value of the guinea, in terms of silver, which had for some time been around £1 1s. 6d. to £1 2s. 0d., rose sharply during 1695, reaching £1 10s. 0d. in June, and keeping above £1 9s. 0d. until March, 1696.[5] It was reduced by Parliamentary action to £1 6s. 0d. in March, and again to £1 2s. 0d. in April, 1696.[6]

If the relative importance of these factors is to be appreciated, an attempt must be made to set out figures for the volume of money and bank credit at suitable dates. Any statistics of this kind cannot hope to do more than suggest orders of magnitude, but the following Table brings together the known or estimated data at six-monthly intervals over the years 1694–1696. The sources of the figures, and the assumptions made in each line, are given in detail in the Appendix. It may be pointed out that, speculative though the figures are, the proportionate variations shown in the last line would not be much altered by any plausible changes in the basic data. The penultimate line, "Half-Yearly Average", is based on the assumption that the average circulation in each half-year was the mean of the figures at the beginning and end of the period. This also is, of course, questionable, but again would not seriously affect the result if it was changed within plausible limits.

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[1] Figures extracted by Mr. Ming-Hsun Li from a contemporary, and apparently authoritative, MS. in the Goldsmiths' Library, University of London (*op. cit.*, pp. 50, 54). They differ slightly from those compiled by Mrs. Schumpeter: "English Prices and Public Finance, 1660–1822", in *Review of Economic Statistics*, 1938, pp. 34–37, but the differences are not important for our purposes.

[2] 7 & 8 W. III, c. 1.

[3] They were acceptable as subscriptions to Government loans until June 24, 1696.

[4] Houghton: *op. cit.*, summarised by Thorold Rogers: *The First Nine Years of the Bank of England*, Oxford, 1887, Table V.

[5] *Ibid.*

[6] 7 & 8 W. III, c. 10 and c. 19.

TABLE 2

MONEY AND BANK-NOTES IN CIRCULATION, 1694–96

(£ million, end of month)

	Dec. 1693	June 1694	Dec. 1694	June 1695	Dec. 1695	June 1696	Dec. 1696
Silver:							
Old full-weight	2·5	2·0	1·5	1·0	1·0	1·5	1·5
Old clipped ..	11·0	11·0	11·0	11·0	11·0	2·0	1·0
New	—	—	—	—	—	0·5	2·7
Gold:							
Guineas ..	6·4	6·7	7·1	9·8	10·2	7·7	7·8
Foreign Coins	—	—	—	0·6	1·2	1·5	1·5
Notes:							
Goldsmiths' ..	2·0	2·0	2·0	2·0	2·0	2·0	2·0
Bank of England ..	—	—	1·1	1·5	1·5	1·6	1·6
TOTAL ..	21·9	21·7	22·7	25·9	26·9	16·8	18·1
Of which, in banks ..	0·4	0·4	1·0	1·0	1·0	0·5	0·4
CIRCULATION ..	21·5	21·3	21·7	24·9	25·9	16·3	17·7
H-Y. AVERAGE		21·4	21·5	23·3	25·4	21·1	17·0
% VARIATION BETWEEN HALF-YEARS ..		—	—	+8%	+9%	−17%	−20%

While the figures in Table 2 exclude hoards (that is, coins deliberately withdrawn from circulation in hopes of a profit later), they need to be supplemented by some discussion of the velocity of circulation of those that remained in use, and also by a review of the recourse had to purchasing-power in non-monetary forms.

The velocity of circulation of money in this period can obviously not be quantified, but some reasonable assumptions can be made. For silver coins it seems to have fallen in1694 and 1695 because of the reluctance with which clipped coins were accepted; but it undoubtedly increased sharply after the end of 1695, firstly when persons holding clipped coins tried to dispose of them while they were still legal tender, and later because the acute shortage of currency must have involved a much more active use of those coins which remained.

As regards guineas, the increase in their value during the first half of 1695, besides stimulating their coinage, must have induced many to retain those which they held, and therefore slowed down their velocity of circulation. If this velocity fell on the average by no more than one-third, the increase in the value of guineas in circulation, from December, 1694, to June, 1695, would have been fully offset. Once the peak value of £1 10s. 0d. per guinea was reached, however, in June, 1695, the tendency of their value on the whole to fall would presumably have at least restored the normal velocity of their circulation. This must have applied with even greater force in the first quarter of 1696, when the devaluation of the guinea was being debated in Parliament.

It will be seen that the tendencies for silver and for guineas reinforced one another in the first half of 1695 (velocity of both falling) and in the first half of 1696 (both rising). In the second half of 1695 they moved, though neither very strongly, in opposite directions. In the second half of 1696 the velocity of circulation of silver probably fell slightly because of the reluctance of the holders of new coins to put them in circulation;[1] there is no reason to suppose any change in that of guineas.

There remains the problem of purchasing-power outside the money supply. In 1694 and 1695 the money-market was depressed, which must have produced some contraction in the supply of private credit instruments generally acceptable as money substitutes. Since the silver coins continued in these years to circulate, so that there was no pressing need for money substitutes, it is improbable that the latter increased. But in 1696 circumstances were quite different. Davenant stated categorically: " When the Coyne grew so corrupted, Credit in a manner performed all the Offices of mony . . .",[2] and Prat, also writing in 1696, remarked that " the current Silver Coin of *England* is, by 3 Parts in 5 too little for our In-Land Trade . . .; the Scarcity of Money occasions the giving of longer Credit than is usual . . .".[3] To some extent these may be exaggerations, but Evelyn's Diary for May 13, 1696 (nine days after demonetisation had been completed), is eloquent support: " Money still continuing exceeding scarce, so that none was paid or receiv'd, but all was on trust . . .". It must inevitably have happened that in 1696 the catastrophic fall in the flow of purchasing-power was substantially cushioned by the extempore use of a variety of kinds of credit instrument—including Exchequer Bills from July onwards.

There can be no doubt, either, that in 1696—and quite possibly also in 1695, as an offset to hoarding—there will have been a tendency to increase the use of cheques. Unfortunately, we have no statistics whatever of bank deposits in the seventeenth century, and it is impossible to estimate either the normal annual flow of cheque payments or the increase in this flow in the period we are considering.

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[1] Hopton Haynes, a contemporary and expert observer, said that it was not until after October 20, 1696, when Parliament finally decided not to devalue, that the new coins acquired a normal velocity of circulation. (*Brief Memoires Relateing to the Silver and Gold Coins* . . ., 1700; MS. in the Goldsmiths' Library, p. 163.)

[2] Charles Davenant: "A memoriall concerning Creditt" (July, 1696), in *Two Manuscripts by Charles Davenant*, Baltimore, 1942, p. 68.

[3] [Prat]: *The Regulating Silver Coin, Made Practicable and Easie* . . ., London, 1696, pp. 30–31.

The conclusions which we have reached may be summarised in tabular form as follows:—

TABLE 3

CHANGES IN FLOW OF PURCHASING POWER AND IN PRICES OF NON-AGRICULTURAL COMMODITIES, 1694-96

Period (1)	Change in volume of money in circulation (Table 2) (2)	Change in velocity of circulation of money (3)	Change in volume of substitutes for money (4)	Change in average price-level (Table 1) (5)
1694: July-December ..	—	Falling	—	−4%
1695: January-June ..	+8%	Falling	—	—
1695: July-December ..	+9%	—	—	+7%
1696: January-June ..	−17%	Rising	Increased	+7%
1696: July-December ..	−20%	Falling	Increased	−7%

A comparison of Column (2) with Column (5) in Table 3 suggests some interesting conclusions. Despite the natural tendency of prices to rise during a war, they fell in the first half-year shown, though there appears to have been no perceptible change in the volume of money. In the first half of 1695 prices were much the same as in the previous half-year, although the quantity of money had meanwhile risen appreciably. Thereafter prices rose for two half-years, while the volume of money first rose again, and then dropped sharply. Finally, in the second half of 1696, prices relapsed, while the volume of money declined more steeply still.

It would seem that very considerable importance must have attached to the influences covered by Columns (3) and (4) of the Table. Except in the second halves of 1695 and 1696, these seem to have been strong enough to outweigh the influence of the changes in the volume of money; and even in the second half of 1696 they were able substantially to modify the deflationary influence of the latter. It is perhaps highly significant that it was precisely in this last half-year that there began the divergence, noted above, between the prices of agricultural products paid by private buyers and those paid by the Government. It was normal for agricultural prices to be lower at the end of December than at the end of June; and for private purchases this was so in 1696, in common with non-agricultural prices. But for Government purchases, agricultural prices rose sharply, the reason undoubtedly being that the Government, unlike the private consumer, had access to relatively unlimited supplies of money-substitutes, viz.: tallies and

Exchequer Bills, and could therefore pay the increased prices charged by sellers to compensate themselves for receiving payment in non-negotiable securities.

III

Are the facts summarised in Table 3 sufficient to answer the question with which we began ? It would appear that they are.

The situation proves to have developed much as described by Mr. Ming-Hsun Li, although the rise of prices began two or three months earlier than he believed. The causes which he enunciated do not, however, fit the bill. Since the increase in prices recorded in Chart II concerned non-agricultural domestic goods, it is improbable that it can have been directly caused either by the bad harvests or by the rise in the price of imports. Nor can it be explained as a reflection of increases in the prices of agricultural or imported goods, because curves similar to Chart II, drawn for those categories of goods, do not begin to rise until September, as Mr. Li indeed reported.[1] As regards the second of Mr. Li's causes—the increase in the velocity of circulation of silver—we have seen that this did not emerge until after the end of 1695; it cannot therefore have been responsible for the beginning of the increase in prices, even though it may have supported this in its latter stages.

Mr. Li's remaining reason—increased purchases by holders of guineas—is, of course, fully valid as far as it goes. But, as will be seen from Table 2, this is only about three-quarters of the explanation. Averaging the volume of guineas in December, 1694, and June, 1695, gives us a mean figure of £8·45 million for the circulation of guineas in the first half of 1695, and the corresponding figure for the second half was £10 million. This shows an increase of £1·55 million. The total increase in circulation was £2·1 million, which conceals an actual decline in the volume of silver money. It is necessary to take into account, in addition to the increased value of guineas, the import of foreign coins, and the increase in Bank of England notes in use, if a complete explanation is to be compiled.

That the resulting rise in prices was less than might have been expected from Feavearyear's description was due to the relative unimportance of the Bank of England's issue amongst the rapidly changing monetary factors of the time. That it was also less than might have been expected from the fiscal situation was due partly to the difficulties in the money-market to which Scott drew attention, but much more to the increasing deficiencies of the currency.

But a rise of prices between July, 1695, and April, 1696, there nevertheless was, followed immediately by an even steeper fall. For both these movements the primary responsibility has been found to lie in the monetary field—for the upsurge, an increase in the money supply, followed by an increase in the velocity of circulation; for the downward movement, an acute fall in the volume of money. We are therefore fully justified in believing that the years 1695 and 1696 showed a real, though mild, inflation, followed by an equally real, though briefer, deflation.

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[1] Mr. Li's index was mainly of agricultural prices. See p. 240, n. 2.

APPENDIX

NOTES TO CHART 1

The data in this Chart cover all the commodities for which acceptable quotations are given in *Prices and Wages in England* for each harvest year from 1683–4 to 1699–1700. In some cases series have been admitted although figures are missing for individual years; data have then been supplied by averaging the two adjoining years. Out of 1,003 figures used, in 59 series, only 34 years' figures have had to be thus supplied. All indices are simple unweighted averages.

A number of series given in the source have not been used because prices remained unchanged for several years at a time; these were presumably contractual prices, and therefore not representative of current levels. An arbitrary rule was adopted, that series were not accepted for inclusion unless prices changed at least once each in the quinquennia 1690–1 to 1694–5 and 1695–6 to 1699–1700. One other series—rosin—was omitted because the fluctuations were inordinate; prices during the war ranged between 300 per cent. and 400 per cent. of the base period, for reasons explained on page 669 of *Prices and Wages in England.* As the total expenditure on rosin in a year varied from a few pounds to at most about £2,500 (*op. cit.*), an unweighted index of import prices would have been unrealistically distorted by the inclusion of rosin.

Where two or more series were available for a single commodity, the price-relatives included in the index are themselves the simple averages of those of each series.

The commodities covered by the Chart are as follows. (The number following each in parenthesis refers to the page in *Prices and Wages in England* on which the corresponding series will be found.)

GOVERNMENT PURCHASES:	
Agricultural goods: (Domestic)	Wheat (567), Oatmeal (577), Malt (574), Hops (567), Beef Oxen (569), Butter (576), Cheese (576), Peas (567) and Biscuit (599).
Non-Agricultural Goods: (Domestic)	Lambeth Ale (428), Coal (434), Candles (434, 674), Diaper (437), Damask (437), Holland (457), Maundy Cloth (458), Laths (493), Lime (496, 672), Bricks (496, 673), Plain Tiles (496, 673), Sand (496), Tallow (672), Paving Tiles (673), Kersey (676), Glue (676), Copper (678), Soap (678).
Imports	Sweet Oil (429), Nutmegs (430), Mace (430), Saffron (430), Ginger (430), White Pepper (430), Almonds (432), Currants (432), Oranges and Lemons (433), Train Oil (672), Tar (673), Pitch (673), Hemp (676).
PRIVATE PURCHASES:	
Agricultural goods: (Domestic)	Wheat (81), Oatmeal (83), Malt (81, 145), Hops (145), Beef (236), Butter (236), Cheese (239), Oats (83), Mutton (145).

The method of interpolation involves a two-stage calculation.[1] Half-yearly points are first obtained, such that they comply with two conditions:—

(*a*) The average value of the two half-yearly points in each harvest year is equal to the index for that harvest year;

(*b*) Subject to (*a*), the sum of the squares of the second differences of the half-yearly values is a minimum.

The process is then repeated, yielding quarterly data, which stand in the same relation to the half-yearly data as these do to the annual indices. These quarterly figures have been plotted on the Chart and joined by a freehand curve.

It follows from condition (*a*) that the average value of the quarterly data in each harvest year is equal to the index for that year; the general level of the curve is thus reasonable. Condition (*b*) smooths the transition between the slopes of the (imaginary) lines joining each pair of annual indices.

The technique implies that prices in any one period are equally affected by those in the periods which preceded and followed it. While this is obviously unrealistic, it is probably less so than assuming that the quarterly indices lie on straight lines within each harvest year, which would follow if the annual indices alone were plotted.

. . . . .

NOTES TO CHART II AND TABLE 1

The quotations included in Houghton's *Collections* for the period 1694–1696 fall into two classes. There is first a series of commodities for which weekly quotations are given for each of a considerable, but varying, number of towns. The only non-agricultural commodities amongst these are coal and tallow, for which the London quotation has been used, and wool, for which (in the absence of a London quotation) that for Reading has been taken.[2] Secondly, there are a number of other commodities (varying somewhat as time went on) for which a single quotation was given each week. In all cases the price used has been that quoted in the first issue of the *Collections* in each calendar month.

The 22 commodities whose price-relatives (1695 = 100) have been averaged to give the index plotted in Chart II, and summarised in Table 1, were:—

Bottles, Candles, Coal, Coney Wool, Copper, Copperas, Faggots, Glue, Gunpowder, Horn Lanterns, Iron, Lead, Leather, Pickled Herrings, Salt, Soap, Starch, Tallow, Tin, Wax, Wire, Wool.

For four commodities plausible estimates have been inserted to supply the absence of a quotation for one week (or in one case four weeks).

NOTES TO TABLE 2

SILVER

The total amount of silver money in existence at the end of 1689 was estimated by Sir Isaac Newton at £13·7 million.[3] Only a few thousands of pounds were coined in 1690–1693 inclusive,[1] and I have assumed in this period a net loss of £200,000 through the diminution of the coinage by wear,[2] export, etc. Of the £13·5 million remaining in circulation at the beginning of 1694, £10 million was hammered money and £1 million "condoned and acceptable counterfeits".[3] Of this £11 million hammered and counterfeit money, £9·6 million was withdrawn for recoinage, partly by tale and partly by weight, and a further £500,000 or so subsequently reached the goldsmiths as bullion. About £1 million remained in use after the recoinage.[4] I have assumed that the great increase in clipping in 1695 affected mainly coins already clipped, but that enough full-weight coins were also attacked to keep the quantity of clipped coins roughly constant, despite the disappearance of some through wear and tear. It also seems plausible that a slightly larger quantity of illegal coins remained in circulation during 1696 than finally survived; I have assumed that £2 million were circulating in June.

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[1] I am indebted to Mr. H. R. Fisher for suggesting the technique adopted, and for providing a formula capable of manipulation by a non-mathematician.

[2] Mr. Li in his thesis appears to have based his conclusion on the whole group of commodities for which a series of quotations was given each week. Most of these were agricultural commodities. But he appears also to have compiled his index by averaging the quotations for each commodity given for all the towns for which one was shown. This produced somewhat misleading results, since price-levels varied widely between towns, and the fortuitous absence of a quotation from one town might (and sometimes did) substantially alter Mr. Li's average.

[3] MSS. at the Mint, Vol. II, folio 609. Cf. Sir John Craig: *The Mint*, Cambridge, 1953, p. 193.

If the above analysis is correct, it implies that there were £2·5 million full-weight coins in circulation in December, 1693. I have assumed that hoarding, clipping and the export of these coins reduced their circulation to about £1 million by December, 1695. During 1695 there was certainly a considerable amount exported to take advantage of the high price of bullion, and in return for gold (see below).[5] I do not see how more than about £1·5 million, at most, can have remained in, or returned to, circulation after hoarding ended in 1696.

The amount of newly coined silver issued in 1696 was £2·5 million from the Tower, plus a small quantity from the provincial mints in the second half of the year.[6] I have assumed £2·7 million in all. Only £500,000 was ready by the end of June, 1696.[7] Hoarding of the newly minted coins ended after October.[8]

GOLD

GUINEAS

The total value of guineas in existence in 1689 was put by Sir Isaac Newton at £6 million, valuing the guinea at £1 1s. 6d.[9] The number of coins was thus 5·58 million. 260,000 guineas were coined in 1690–93, inclusive; 57,000 in 1694; 717,000 in 1695; and 138,000 in 1696 (before March and after October).[10] Newton, however, estimated that each year one-eighth, being above the average weight, were culled out and melted down.[11] The following

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[1] *The Mint*, p. 416. Cf. Newton MSS., Vol. II, folio 253.

[2] At the end of the eighteenth century the annual loss of silver from the coinage by wear was estimated at about 0·3%. (Jacob: *An Historical Inquiry into the Production and Consumption of the Precious Metals*, London, 1831, Vol. II, p. 384, Appendix 1c.)

[3] *The Mint*, p. 193. [4] *Ibid.* [5] Hopton Haynes: *op. cit.*, p. 126.

[6] *The Mint*, p. 416; Newton MSS., Vol. II, folio 253.

[7] *The Mint*, p. 191.

[8] Above, p. 236, note 1.

[9] *The Mint*, p. 193. Newton MSS., Vol. II, folio 609.

[10] *The Mint*, p. 416, gives the figuressin values, taking the guinea at £1 1s. 0d. Newton's MSS., Vol. II, folio 253, give them taking the guinea at £1. There is an unexplained discrepancy between the two figures for 1694, but it is too small to affect those here quoted. The coinage of guineas was suspended from 2.3.1696 to 10.11.1696 (7 & 8 W. III, c. 13, and 8 W. III, c. 1.)

[11] MSS., Vol. II, folio 609. The ratio may have been one in four, this possibility being mentioned by Newton elsewhere in his MSS, Cf. Craig: *Newton at the Mint*, Cambridge, 1946, p. 37.

Table shows how the amounts for Table 2 were calculated from these data, and from the price of guineas quoted by Houghton and transcribed by Thorold Rogers.[1] (I have assumed that the coinage was evenly divided between the two halves of the year.)

TABLE 4

GUINEAS IN CIRCULATION AT VARIOUS DATES (END OF MONTH)

Date	Net number of guineas (millions)	Value per guinea	Total current value (£ million)
1693: December ..	5·81	£1 2s. 0d.	6·39
1694: June	6·06	£1 2s. 0d.	6·67
December	6·31	£1 2s. 6d.	7·10
1695: June	6·62	£1 9s. 6d.	9·76
December	6·93	£1 9s. 6d.	10·22
1696: June	7·00	£1 2s. 0d.	7·70
December	7·05	£1 2s. 0d.	7·77

No allowance (other than the one-eighth of new mintings mentioned above) has been made for meltings and exports because throughout 1694–6 the value of the guinea in relation to silver was higher in England than on the Continent; guineas were accordingly imported.[2] Meanwhile they were also being shipped abroad for the pay and maintenance of the Army. I can make no guess which of these movements was the more extensive.

FOREIGN COINS

The estimate of an intake of £1·5 million in 1695–6 was made by Newton.[3] No doubt there was a considerable number of such coins previously in circulation, but I have not attempted to estimate how many.

GOLDSMITHS' NOTES

The only contemporary attempts at a complete estimate of the monetary circulation, of which I am aware, were made by Davenant.[4] These, however, do not distinguish between Bank of England notes and goldsmiths' notes, and are in any case untrustworthy in respect of figures which can be checked.[5] The only other estimate of the value of goldsmiths' notes which I have encountered was made by John Pollexfen, a member of the Council of Trade, who stated in the summer of 1696 that since the " shutting of the Exchequer " in 1672 the issues of the private bankers had not totalled more than £2 million.[1] Assuming that this figure is correct, it seems reasonable to suppose that the maximum amount would have been in circulation in 1695–6. Any decline in 1695 due to money-market stringency may well have been offset by speculative purchases of guineas for notes.[2]

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[1] Above, p. 234, note 4.

[2] Hopton Haynes: *loc. cit.*

[3] MSS., Vol. II, folio 610.

[4] (*a*) "A memoriall concerning creditt," July, 1696, in *Two Manuscripts . . .*, pp. 67–69.

(*b*) *Essay on Public Virtue*, Part I. MS. in Goldsmiths' Library, University of London, pp. 244–5. The MS. is undated, but appears to have been written between September 11, 1696, and May 4, 1697.

(*c*) *Discourses on the Public Revenue*, Part I, Discourse II, 1698. Reprinted in Whitworth: *The Political and Commercial Works . . .*, London, 1771, Vol. I, pp. 161–2.

[5] All three estimates seriously underestimate the coins in circulation, and include an untenable item of £20 million for mortgages, alleged to be in circulation as money.

BANK OF ENGLAND NOTES

It is not at all clear how quickly the notes issued by the Bank of England got into circulation. Luttrell says that £112,000 were issued on August 1, 1694.[3] Clapham implies that £1·2 million had been issued by November, 1694, but that some of these notes had already been returned to the Bank.[4] It is known that " running cash " notes, in addition to the £1·2 million " sealed bills " were being issued in and after December, 1694,[5] but not in what amounts. In November, 1696, the total amount of liabilities on notes was £1,658,000.[6]

COIN AND NOTES IN BANKS

This is, of course, a mere guess. Following scattered indications in the literature, I have assumed that, in general, a 20 per cent. cash ratio was maintained by the goldsmiths,[7] but that in 1696 this was probably not fully attained. The Bank of England appears to have received in cash £600,000 of the £720,000 paid up in 1694.[8] I have assumed that this was progressively dissipated in the early part of 1696, and remained at a low level from May (when the Bank suspended payment) until after November, 1696, when we know that its holding of cash and goldsmiths' notes was only £45,000.[9]

London.

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[1] *A Discourse of Trade, Coin and Paper Credit*, 1697 (preface dated July 15, 1696), p. 70.

[2] *Advice to the Merchants and Traders of England*, February, 1696, p. 1.

[3] *A Brief Historical Relation of State Affairs*, Oxford, 1858, Vol. III, p. 351.

[4] *The Bank of England: A History*, Vol. I, p. 23.

[5] Richards: *Early History of Banking in England*, London, 1929, p. 158.

[6] Clapham: *op. cit.*, Vol. I, p. 44, n. 2.

[7] Some of the evidence for this is summarised in my " The Cash Ratio in English Banks before 1800 ", in *Journal of Political Economy*, February, 1949, p. 70.

[8] Clapham: *op. cit.*, Vol. I, p. 305. Cf. Vol. I, p. 32, for the Bank's distrust of goldsmiths' notes.

[9] Clapham: *op. cit.*, Vol. I, p. 43.

The United States National Income à La Russe

By A. Nove

In a recent issue (No. 11 of 1955) of the Soviet periodical *Voprosy Ekonomiki*, a Russian professor of economics, Kolganov, has attempted to recalculate the U.S. national income according to Soviet-Marxist principles. His raw material was the data on U.S. national income in current prices for the year 1950, as published in the *Survey of Current Business* in July 1953. In his preamble, Kolganov complains of allegedly erroneous recalculations of the Soviet national income, carried out in America by Bergson and others, and it is possible that these stung him into attempting a counterblow. Kolganov's efforts are of interest from three different standpoints: firstly, as a practical example of the application of the Soviet national-income theory to western national accounts; secondly, for the light which this sheds on the way in which Soviet statistics are compiled; and thirdly (alas !) as a demonstration of how statistics can be handled in order to arrive at ideologically desirable conclusions.

The essential theoretical difference between the Western and Soviet concepts of national income is this: the Marxist, like Adam Smith, considers that only those engaged in the production of material goods are " productive "; consequently administrators, teachers, soldiers, bath attendants, doctors, opera singers, opera dancers and the rest generate no national income by their activities, however vital these may be. The incomes of the unproductive sectors arise, in the Soviet view, from the redistribution of income created in the productive sectors—by taxation, personal expenditures on services, etc. Soviet practice also treats passenger transport and personal postal services as unproductive, though it can be argued (with quotations from Marxist canon) that this is unsound. The position on trade is ambiguous. In so far as it consists of physically handling goods, it is considered productive, and Soviet trade is therefore so regarded. However, it has sometimes been claimed that in " capitalist " countries, where there is heavy expenditure on competition and advertising, trade is essentially unproductive. Kolganov, none the less, accepts the whole of the U.S. net product of trade, even (as we shall see) adding to it, while remarking that part of the product realised through unproductive trading activities is " created " in industry. However, since he makes no statistical allowance for this, we can leave this argument on one side. Other complications will be dealt with as they arise.

Kolganov follows Western practice by excluding depreciation from national income, but he has trouble with indirect taxation. His judgment has no doubt been influenced by the fact that Soviet statisticians include turnover taxes in the Soviet national income, though they generally argue that turnover tax is really no tax at all, but conceptually indistinguishable from " profits of socialist enterprise ". In any event, Kolganov includes excise duty and sales taxes, i.e. the items most closely resembling turnover tax, in the U.S. national income, as part of the net product of trade. He argues that to leave these taxes out would be to omit an important element in the distribution of purchasing power and resources; current-price calculations, he holds, should be made in prices as they really are. The result of his calculations, in the aggregate, is therefore a curious hybrid, more or less corresponding to net national product at market prices, except for the omission of that portion of " indirect business taxes " (property taxes, customs, etc.) not included under the headings of excise and sales taxes.

We can now proceed to trace the steps of Kolganov's analysis. Whenever possible, his own tables are used, though these have occasionally been somewhat simplified, without (so it is hoped) affecting his basic argument. All figures, unless otherwise stated, are in millions of dollars. U.S. comparisons, where quoted, are given as they were published in 1953 (i.e. in the version available to Kolganov), and not as subsequently amended.

According to the Soviet scheme, the productive sectors consist of the following: Industry, Agriculture, Construction, Transport and Communications, and Trade. The first task, then, is to rearrange the " sector of origin " data in this form, while omitting sectors deemed " unproductive ". Kolganov begins in this way because the Soviet national income is traditionally built up from the production side.

Industry, in this version, consists of the sum of the U.S. headings " Mining " and " Manufactures " (80,002), plus the following:

(*a*) Electricity and Gas (3,836), which the Americans include under " Communications and Utilities ".

(*b*) Local-authority utilities (114), similarly transferred.

(*c*) Services to industry of engineer-consultants (849), included with " Services " in the U.S. accounts.

(*d*) Rent and royalty payments by industrial enterprises (2,203). In the Marxist view, these are part of the net product created by the paying enterprise, whereas the Americans credit these sums to the recipients.

(*e*) Nearly the whole product of Government Enterprises (2,257), the one exception being postal services rendered to persons. To arrive at a figure for " productive " postal services, he deducts the *gross* expenditure on posts by persons from the official U.S. figure for the *net* product of the postal services. Apart from the evident unsoundness of this procedure, posts clearly do not belong in Kolganov's definition of " Industry "; it is odd to see them separated from telephones and telegraph for no better reason than the fact that the latter are privately owned in the United States. Kolganov is unhappy about treating other government enterprises as " productive " in his sense, but claims that there is not enough information to draw a satisfactory line.

Agriculture's net product is measured by the official U.S. figure (18,100), with the following adjustments:

(*a*) Minus imputed rent of dwellings (1,468). Imputed rents are disregarded throughout, the consumption of housing being measured (as will be seen) by the depreciation of dwellings.

(*b*) Plus " taxes " (865), mortgage interest (226) and net land rent (1,093), which are omitted from the U.S. figure. Rent and interest are treated as values created in agriculture.

Transport and communications present awkward problems, since services rendered to persons have to be excluded. U.S. statistics do provide a figure of net product of goods haulage by road, but the other transport items have to be adjusted on the very rough assumption that the proportions of revenues accruing from passenger and goods services apply also to the net product. In the case of telephone and telegraph, Kolganov applies the same unsound method which has already been noted in the case of posts: he takes the net product as reported by the Americans (2,980) and deducts the gross expenditures on these services by persons (!), which leaves him with only 909. The results of these adjustments may be worth comparing with the American figures in detail :

Soviet version	
Rail transport	6,485
Road transport	2,812
Water transport	675
Air transport	81
Pipelines	260
Telephone and Telegraph	909
TOTAL	11,222

American version	
Railroads	7,150
Local rlys., buses, etc.	1,316
Highway freight	2,812
Water transport	743
Air transport	424
Pipelines	260
Allied services	586
Telephone and Telegraph	2,980
Radio and TV	311
TOTAL of above	16,582

Trade, as we have seen, is made to include the proceeds of excise and sales taxes (12,569), and also hotels (1,277) and a small item for miscellaneous repairs and hand trades (846). All this has the odd, perhaps intended, effect of giving trade almost a third of the national income. (But why are hotels productive and is passenger transport not ?)

The U.S. figure for Contract construction is used unaltered; other construction activities are unavoidably included in the sectors which undertake them (in the U.S.S.R. they are grouped together under the heading of Construction).

Since other items are unproductive by definition, national income by sector of origin may now be compared with the American version, as follows:

Soviet version	
Industry	89,261
Agriculture	18,100
Construction	11,962
Transport and communications	11,222
Trade	58,247
TOTAL	188,792

American version	
Agriculture, etc.	17,384
Mining	5,202
Contract construction	11,962
Manufacturing	74,800
Wholesale and retail trade	43,555
Finance, insurance, etc.	20,964
Transportation	13,291
Communications and utilities	7,241
Services	22,328
Government and govt. enterprises	23,360
Rest of world	545
TOTAL of above	240,632
Excise and sales taxes	12,569
	253,201

As the Kolganov total includes excise and sales taxes, it seems right to include these also in the comparable American figure, which is therefore over 33 per cent. the greater.

Kolganov now turns to the income side. Here his task is evidently to show the high proportion of the total which goes to the " exploiting classes ". Since this is a classification unknown to American statistics, his first task is to define " exploiters ". He proceeds as follows:

(*a*) From the U.S. total of wages and salaries, he deducts " compensation of corporation officers " (7,067), which is taken to be approximately equal to income of exploiters under that head.

(*b*) 73·9 per cent. of the net product of farming is deemed to be " capitalist " on the grounds that 73·9 per cent. of *sales* by farmers originated in farms with an income of over $2,500, a level at which hired labour is generally employed. In this way, nearly three quarters of farmers' net incomes become due to them in their capacity as " exploiters ". The rest is included with working persons.

(*c*) All non-farm income of " unincorporated enterprises " is credited to exploiters. (These include doctors, many small tradesmen, and so on.)

(*d*) Interest, defined as " net interest originating in private business " less the estimated amount paid by unproductive enterprises, appears here, as do land rent and royalties, and of course profits of corporations before tax. Receipts of house rents are disregarded in this context as unproductive.

Kolganov allows for inventory revaluation, though his explanation shows that he did the right thing for the wrong reasons (he supposes " inventory " to mean materials *used up*. He then gives the income side of the account at its primary stage, i.e. before transfers to unproductive sectors. In this account, logically enough, neither wages, nor profits, nor any other income derived from " unproductive " activity can appear, and so the table looks decidedly odd to Western eyes.

National Income (*productive, first stage*)

Wages and salaries in production	69,948
Supplements to the above*	4,927
Wages and salaries in trade	27,337
Supplements to the above*	1,014
Incomes of working farmers	3,470
SUB-TOTAL (Toilers)	106,696
Profits of corporations before tax	31,595
Incomes of capitalist farmers	10,115
Other incomes of unincorporated enterprises	16,453
Compensation of corporation officers	7,607
Interest	1,194
Land rent and royalties	3,316
SUB-TOTAL (Exploiters)	70,280
Excise and sales taxes	12,569
TOTAL of above	189,545
Discrepancy	− 753
TOTAL	188,792

* Accident pay, social insurance benefits, etc.

The above figures enable Kolganov to make such statements as : that workers and employees in material production receive only 39·5 per cent. of the national income, a result he arrives at by ignoring trade in this context ; he also asserts that " 52 per cent. of the national income goes to the capitalists, who spend about 15 per cent. on paying their employees in Trade. . . ." He is plainly determined to squeeze every ounce of propagandist advantage out of his tables !

Next Kolganov must redistribute the national income, to take the " unproductive sectors " into account. But in his final table, incomes derived from or expended on services will have to be omitted to be consistent with his theoretical basis. In other words, the unproductive sectors can only appear as consumers of material goods, which are, so to speak, redistributed to them. However, since Kolganov has chosen to arrange his tables in such a way as to distinguish between " toilers " and " exploiters ", it follows that he will have to determine how each of these categories disposes of its income. This involves him in a series of somewhat hazardous calculations.

First, by stages which are here left to one side, he decides that total personal incomes in 1950 amounted to 223,860. The sum total of incomes of " working persons ", including earnings in unproductive spheres, amounts to 160,445; this last figure seems to be made up of the official figures for wage and salary receipts, less pay of corporate officers, plus incomes of " working farmers ", plus transfers. It would seem from the above that incomes of the " exploiter " group would be 63,415, the difference between the two above figures. But by sleight of hand he increases it. He does this by adapting U.S. figures of personal expenditures, with differences from the U.S. form to be noted in a moment. This looks as follows:

Personal Expenditures

Soviet version		*American version*	
Material goods	143,088	Commodities	131,818
Services	40,927	Services	62,732
Taxes	32,033	Personal taxes	20,873
Savings	11,283	Personal savings	11,283
Social insurance contributions	2,894	Social insurance contributions	2,894
TOTAL	230,225	TOTAL	229,600

There is a discrepancy of 6,365 between personal incomes and personal expenditures, in Kolganov's calculations. He allocates the entire discrepancy to the " exploiters ", and so, by subtracting the income of working persons from total expenditure, he decides that expenditures of " exploiters " were 69,780 (230,225–160,445).

Before going any further, it is necessary to explain the make-up of the above expenditure table. Although it looks near to the American version in total, it is different in a number of respects. (No one table arranged in this way exists in the American accounts, and it has been reconstructed.) The Soviet figures differ as follows: 8,142 is transferred from Services to Commodities, to correspond to " productive " services, and estimated depreciation of dwelling-houses (measuring the " consumption of housing ") is also added to expenditures on material goods. Services lose the above-named 8,142 and in addition Kolganov deducts " Imputed rents ", urban and rural, which amount to 14,663. These rents are excluded altogether from his version of the national accounts. However, this " loss " is almost balanced by the larger sum recorded under " taxation ". Kolganov advances no explanation of his figures, which only make sense if he includes here all " indirect business taxes " other than excise and sales tax (e.g. property tax, motor vehicle licences, etc.).

The logic of Kolganov's " class " analysis drives him, as has been said, to calculate separately the disposal of incomes by exploiters and working persons. He uses for this purpose data on 1944 published in the 1952 issue of the *Statistical Abstract of the United States*. He makes the assumption that anyone who earned over $4,000 per annum in 1944 may be considered an " exploiter ". Using the data in the *Abstract*, Kolganov calculates that, in round figures, the exploiters spent 45 per cent. of their 1944 incomes on commodities, 13 per cent. on services; 20 per cent. was paid in taxes, 22 per cent. was saved. He then assumes that these percentages apply to 1950, so he applies them to the calculated expendable income of the said exploiters, i.e. to 69,780. The expenditures of the " toilers " are obtained by subtraction from the totals given in the personal expenditure table above. The result will be shown in the final income table. The *reductio ad absurdum* of the method may be seen in what happens to savings. " Exploiters " saved 22 per cent. of their total expendable income, this income was 69,780, therefore they saved 15,352; but total savings were only 11,283 (given); therefore, the working population *dissaved* 4,069 in 1950; Q.E.D. If Kolganov has a sense of humour (which is not totally impossible), he might be suspected of deliberately guying some of the more elaborate efforts of western scholars to fill in gaps in Soviet statistics.

Here, then, is his final income table, slightly simplified, still representing only the amounts which the recipients spend on goods or save.

Income of workers, employees and (working) farmers	
Expended on goods	111,687
Savings	–4,069
	107,618
of which: incomes of persons engaged in:	
Production	49,289
Trade	18,295
State employment	13,237
Services	13,990
Other (pensions, etc.)	12,807
Incomes of the exploiting classes	
Expended on goods	31,401
Savings	15,352
Undistributed profits	8,713
	55,466

Income of the State

Purchase of materials	14,185	
New construction	7,000	
Profits of State enterprises	–378	
Budget balance	8,274	
	29,837	[29,081]*
TOTAL of above	192,921	[192,165]*
Discrepancy	–4,129	[–3,373]*
TOTAL	188,792	

* Figures in brackets are corrections of the originals' arithmetical errors.

In the above table, " income of persons engaged in production " is only 25·5 per cent. of the whole, a point duly recorded by Kolganov in his comments. Working farmers, in his definition, receive only 1·2 per cent. *All* working persons account for 55·8 per cent., but these " include the top of the bourgeois intelligentsia, higher officialdom, generals . . ", so that " it can be said with certainty that the share of working persons in the national income of the United States is less than half ". Soviet propagandists will doubtless utilise these conclusions in comparisons with the U.S.S.R., where, as is repeatedly asserted, everyone is a " working person ".

Finally, Kolganov endeavours to calculate the relative magnitudes of the consumption and accumulation funds. The definition of these funds is drawn from Marx's *Critique of the Gotha Programme*, and is of interest in showing the way in which Soviet published data on consumption and accumulation are calculated. Most items are drawn direct from U.S. sources, or have already been explained. One omission, deplored by Kolganov, and blamed on lack of published data, is changes in government-held stocks.

Consumption and Accumulation, 1950

Consumption	131,818	
" Material services "	8,142	
Depreciation of dwellings	3,128	
Government purchases	14,185	
CONSUMPTION	157,273	[81·5%]
New construction	29,733	
Equipment	22,299	
Stocks privately held	7,510	
Net overseas investment	–2,304	
Depreciation	–21,604	
ACCUMULATION	35,634	[18·5%]
Discrepancy	–4,115	[–3,115]*
TOTAL	188,792	

* Correction of arithmetical error in original.

The American version gives a very similar figure for " Accumulation " (i.e., private and State new construction, equipment, stocks and net overseas investment, less depreciation). However, the total national income would naturally be much larger; the figure corresponding to Kolganov's coverage being, as we have already seen, about 253,000. Therefore, as Kolganov duly notes, the percentage devoted to accumulation is considerably higher if worked out in the Soviet-Marxist manner. It is a matter of pride in the U.S.S.R. that they accumulate a much higher proportion of the national income than do the " capitalist " countries, and so Kolganov seems embarrassed by the magnitude of the percentage he has calculated for the United States; in years of crisis he points out, it is lower, sometimes even negative.

It would be easy merely to dismiss the above attempts as nonsense. It is true that Kolganov is sometimes inconsistent, often twists figures for transparently propagandist purposes. His attempts to deal statistically with the " exploiters " are simply laughable. Yet it is still worth looking closely at this attempt to present the U.S. national income in Marxist guise. Some of the Marxist definitions look curious, but no one who has tried to calculate the net product of British banking and finance would claim that no anomalies exist in our system of national accounts. If Adam Smith had been charged with devising a system of national accounts, his " sector of origin " table might well have had something in common with Kolganov's; he, too, would have treated the income of a civil servant or a dentist as a species of transfer from the " productive " sector. While we have every reason for justifying our own methods, the other approach is not simply " wrong ". One wonders what would happen if the national-income statisticians of East and West met for a discussion. No doubt the gap between the basic philosophies would remain unbridged, but perhaps the Soviet specialists would learn that the methodology of their Western confrères does not stem from their being hireling-apologists (as is too often asserted in Soviet publications), and both sides might gain a clearer view of the other's concepts and definitions.

Leisure and International Trade[1]

By V. C. Walsh

This article will be concerned with the extension of the usual analysis of international trade in terms of two countries and two commodities,[2] to include the treatment of variations in leisure preference. No restriction is placed on the number of factors of production; I shall assume that all individuals in a country have identical consumption indifference curves, and draw community indifference curves on this basis; also that everyone in a country owns an identical amount of every factor, so that any change leads always to an equal distribution of income. These assumptions, though drastic, do not prevent the raising of the problem I wish to discuss.

Suppose then that trade is opened between two countries such as I have been describing, and consider the situation in either of them. The opening of trade will have made it possible for this country to move on to a higher community indifference curve by taking advantage of the new possibilities of exporting and importing. But suppose that instead the citizens prefer to produce less than before of one or both commodities, and to take advantage of the new opportunities offered them through the opening of trade by enjoying more leisure, so that the production block shrinks in the manner shown in Fig. I. Can we say that they are on the same community indifference curve? Surely not: for one thing, they are clearly in a preferred position in some sense, since they are supplying less work. Again, the indifference curve to which the exchange line after trade is tangential in the diagram cannot be regarded as the same curve as that which existed in the before-trade position, since the opening of trade has induced consumers to alter the proportion in which they consume leisure and other commodities, and this may result in a change in the shape of the curve which relates their preferences for different amounts of each of these other goods. If the two other goods are armchairs (supposing people use these more when overworked) and tennis racquets, then an increase in the consumption of leisure may well alter their preferences as between these two goods. This fact makes it impossible to say anything about the position after trade has opened, if the production block shrinks.

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[1] I am grateful to Professor Meade, Dr. Helen Makower, and Dr. S. A. Ozga for their comments and criticisms.

[2] It has been claimed that the production indifference curve approach to the treatment of cost conditions in international trade " avoids the difficulties involved in real-cost analysis for the most part only by ignoring the existence of some of the considerations which real-cost analysis takes into account " (Viner, *Studies in the Theory of International Trade*, p. 521), and that " The opportunity cost doctrine as presented by Professor Haberler could be applied only . . . where the total amounts of the various factors of production remain unchanged after trade has taken place " (Samuelson, " The Gains from International Trade," *A. E. A. Readings*, p. 247). As presented, the production indifference curve " constitutes merely a series of maximum-possible combinations of product when a given stock of productive factors is employed, presumably to its physical maximum. In an actual situation, the actual product-combination would not be on this curve, but would be somewhere below it, if the amounts of the factors, or the extent to which they prefer leisure to employment, were dependent upon the rates of remuneration and if the equilibrium rates of remuneration were lower (or higher) than those rates which would induce each factor to render the maximum amount of productive service of which it was physically capable " (Viner, *op. cit.*, p. 521).

Prima facie this looks like a serious criticism of the usual geometrical treatment of cost conditions in international trade. But one of the consequences of the generalisation attempted in this article will be to indicate how the geometry can be extended to cover the possibility of alternation in leisure preference resulting from trade.

I shall now try to show how the geometrical analysis can be modified so as to escape from this difficulty, using a construction familiar in other contexts, such as the theory of taxation, where it has been used by Mr. Little.[1]

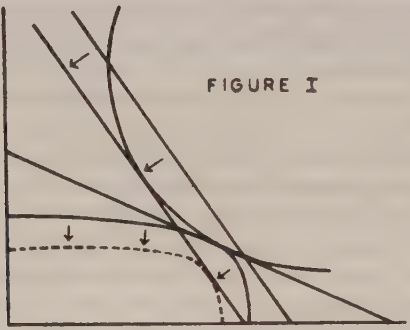

FIGURE I

Consider a three-dimensional diagram, with the third axis representing leisure. Our production block now becomes a sort of hump or sausage, stretching out into the third dimension and diminishing in section as it does so. What can we say about its shape? To begin with, it will certainly diminish in thickness, since a movement outwards in the third dimension implies taking more leisure, and taking more leisure in turn implies supplying less factor services, and thus being able to produce less of at least one of the two goods where production possibilities trace out the curved sides of the sausage. In the case of the production possibility surface illustrated in Fig. II, the outline of the surface is concave to the origin in the XZ and YZ axes as well as in the YX axis—this reflects the assumption, probably the most reasonable one to make, that there are diminishing returns in the application of greater and greater amounts of work (less and less leisure) to the other factors. Furthermore, as we move out in the third dimension and take slices through the sausage in the XY section, the outline of the sausage may change its shape: this simply reflects the fact that as less work is done the relative effectiveness of our country in the production of X and Y may change—where much work is done, the country may be more effective in the production of X than Y, and where little work is being done the reverse may be the case. If we

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[1] I. M. D. Little, "Direct versus Indirect Taxes," *Economic Journal*, lxi (September 1951).

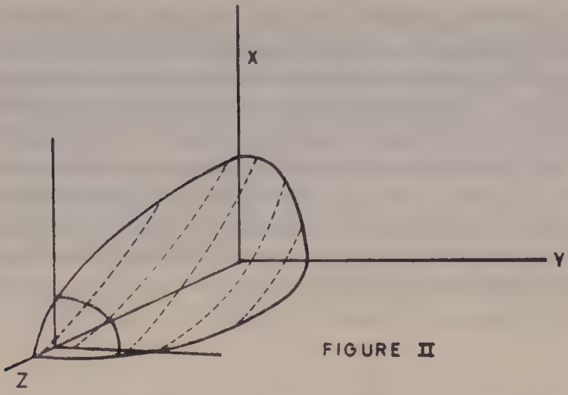

FIGURE II

then take sections through the sausage in the XY plane, we can mark off on each a series of points having the same slope. The dotted lines on Fig. II plot a series of such points of equal slope.

The next step is to put in the three-dimensional equivalent of the exchange line. It will be a sheet, leaning against the side of the production possibility surface, and can be thought of as made up of lines, all at the same slope in the XY axis and all tangential to the production possibility surface at some point on the latter's XY outline. If we move out along the Y axis, taking a series of slices through the sausage in the XY section, the exchange sheet will show as a line which will always have the same slope in the XY plane but which will be tangential to a series of different points on the outline of the sausage. This is because the latter is changing shape as we move out in the third dimension. The whole sheet need not be drawn—for our purposes it is sufficient to draw sections through it in the XY plane. A couple of such sections are shown in Fig. III below. P and P′ are two points

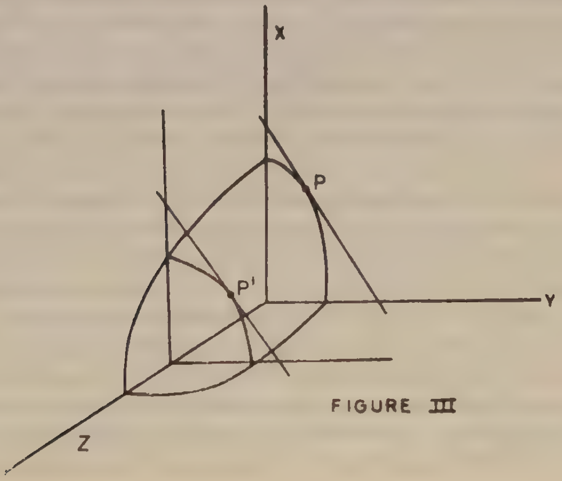

FIGURE III

of tangency between sections of the sausage and sections of the exchange sheet, having the same slope. The dotted line shows the locus of all other points on the sausage having the same slope as P and P′.

The last piece of apparatus which we need is the three-dimensional equivalent of the community indifference curve. This now becomes a curved sheet, covering all points of indifference in terms of two commodities and leisure. It can be drawn most easily if we assume that there is some amount of X and of Y and of Z, having which will compensate consumers for having none of the other two commodities; the sheet then looks as in Fig. IV:

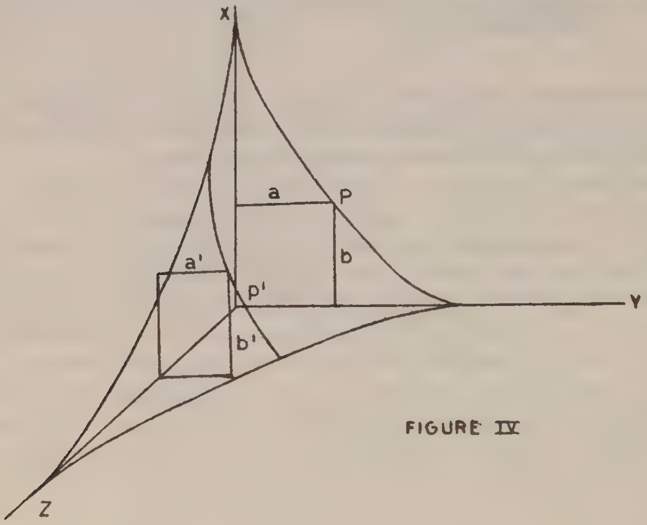

FIGURE IV

The properties of the community indifference sheet can be seen from the diagram: there are diminishing rates of substitution between X and Y, X and Z, and Y and Z, that is to say, on the section in each plane. Secondly, there are possibilities of complementarity and substitution: as we move out along the Z axis, taking more leisure, this is likely to alter our preferences as between tennis racquets and armchairs—we are likely to want to play more tennis as we have more leisure. If we take two sections parallel to the XY plane at different distances out along the Z axis, we may get sections of the indifference sheet having different slopes, as at P and P′, where P and P′ are points such that a : a′ : : b : b′. Finally, there is only one point of tangency between the indifference sheet and the production surface. This is ensured by the shape of the production surface, together with the convexity to the origin of any section of the indifference sheet. Lower indifference sheets will intersect the production surface, higher ones will miss it altogether; one sheet will touch it at just one point, and this will be the highest sheet onto which it will be possible for our country to get in the absence of trade. Probably this point will lie some distance out along the Z axis, since even in the absence of trade consumers will presumably prefer to take some leisure. Now slice the sausage parallel to the XY plane, at the point where the indifference sheet touches it. The slope of the common tangent to production surface and indifference sheet at this point will be the slope of the exchange in the absence of trade. All this will show in the XY section.

This is the equilibrium in the absence of trade. From now on we shall not need to draw the whole community indifference sheet, nor the whole of the exchange sheet: the effects of trade can be shown by drawing sections in the XY plane at different distances along the X axis.

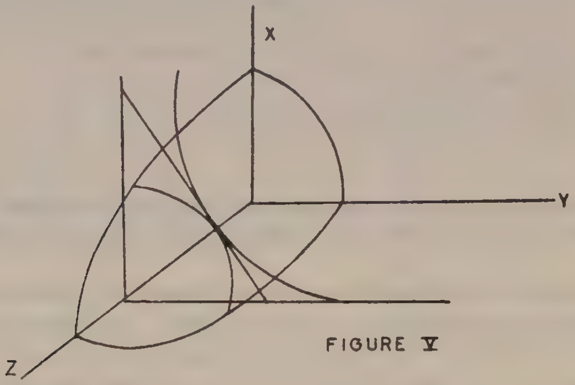

FIGURE V

Now suppose that trade is opened, and that the inhabitants of our country prefer to take advantage of the new exchange ratio and possibilities of export and import by having more leisure. This will show simply as a movement of the equilibrium point along the leisure (Z) axis. A section taken parallel to the XY plane at the point of trade equilibrium along the Z axis will show a section of the exchange sheet, tangential at one point to a section of the indifference sheet, and at another to a section of the production surface. The country will produce the amounts AB and BC of commodities Y and X respectively, export EB of Y in return for EF of X, and thus consume GF of Y and FD of X. Finally, they are now taking OH leisure instead of OK (see Fig. VI).

It is possible to show the effects of trade in the XY section, despite the fact that the problem is three-dimensional, because the movement resulting from the opening of trade is made up of two different sets of components, one set in the XY plane and the other consisting of a movement out along the leisure axis. The actual trade takes place in the XY plane, because leisure is not an internationally traded good. The indifference curve to which the exchange line after trade is tangential is a section of a higher indifference sheet than that to which the production surface was tangential before trade. Thus the three-dimensional construction retains the property of the usual geometry of international

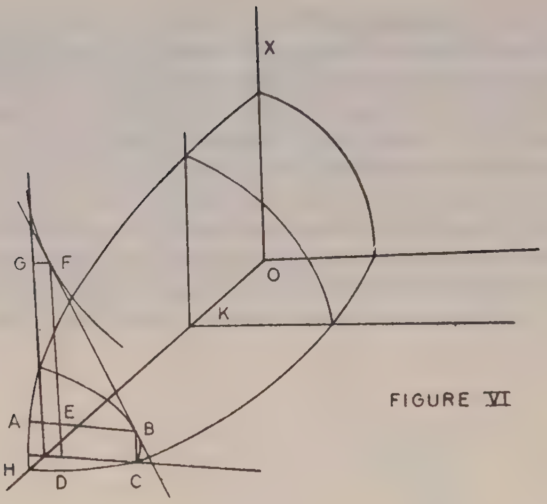

FIGURE VI

trade, of offering a single necessary and sufficient condition for the presence of a gain—in this case movement to a higher indifference surface.

There remains to be illustrated a rather interesting possible effect of changed leisure preference upon a country's trade: as different amounts of labour are combined with the other factors in a country, its relative effectiveness in the production of different commodities may change, and it may go from importing Y and exporting X to importing X and exporting Y. Suppose for the sake of argument that if the citizens of our country can choose how much leisure they will have they would choose to take OA in Fig. VII. They would then export Y and import X. Now suppose that a government regulation or some other circumstance forces them to work a minimum day which diminishes their leisure from the equilibrium position OA, to some point B. They will now export X and import Y:

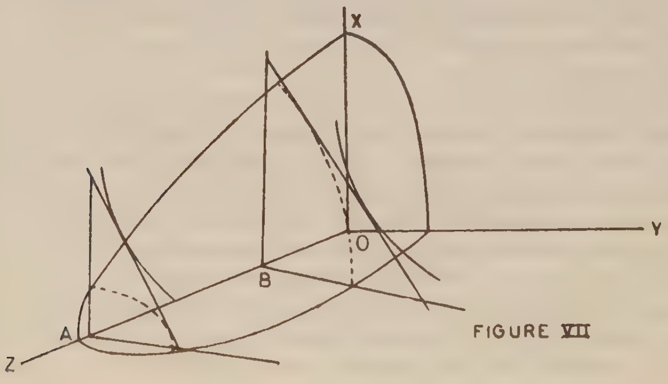

FIGURE VII

Again, trade can take place between two countries simply because their leisure preferences are different, despite the fact that their production possibility surfaces are the same and their indifference curves at the no-trade position are identical in the XY section. Fig. VIII illustrates a trading equilibrium between two countries which have production surfaces identical in all respects and identical indifference curves (shown by the dotted lines) in the XY plane at the no-trade position, but differing shapes in the XZ and YZ planes:

For simplicity, only the XY sections of the production sausages at the two points of equilibrium have been shown. These sections differ in shape, but this is because they are slices taken at different distances along two identically shaped sausages.

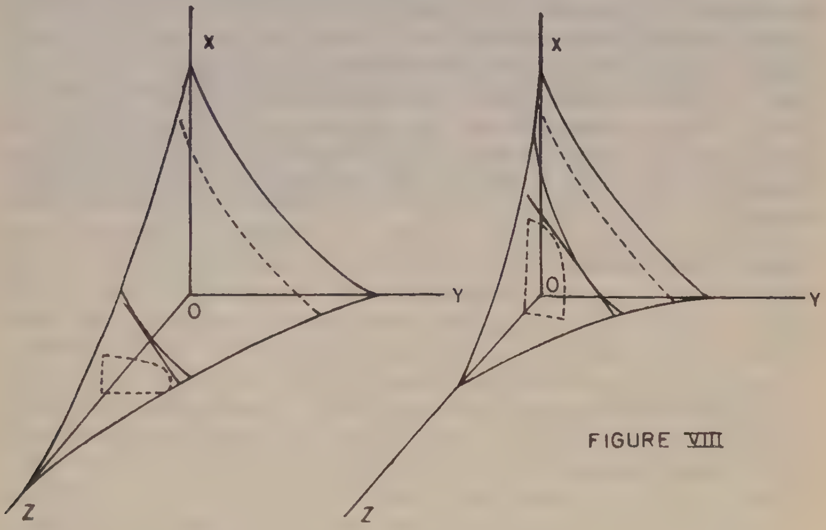

FIGURE VIII

Clearly the effects of leisure preference upon the goods traded by a country are very liable to be different in different parts of the world: " a man who lives in a society which values leisure and which attaches no social stigma to living at close-to-subsistence level will begin to offer less labour when small increases occur and when the price is very low ".[1] These conditions are said to be specially characteristic of underdeveloped countries: " It has long been believed to be true of the people of the British West Indies. The ideas that the British West Indian has a large preference for leisure over work and that his wants are small have been advanced by the planter communities of the islands for many years and have been written into Royal Commission and other public reports."[2]

[1] Simon Rottenberg: " Income and Leisure in an Underdeveloped Economy," *Journal of Political Economy*, April 1952, p. 96.

[2] *loc. cit.*, p. 97.

Whether or not this is true of the British West Indies—and the author cited offers reasons to doubt that the position is as simple as that—clearly we may admit that an underdeveloped country with a social situation which produced a high leisure preference might have a quite different pattern of imports and exports from what it would have if the effective labour supply were different.

I conclude from all this that the geometrical treatment of cost conditions in the theory of international trade has greater generality of application than it has sometimes been seen to have. Further, that its use does not involve trivialising the theory of cost, or leaving out any considerations which a " real " cost theory could introduce. These conclusions do not—fortunately—depend on our carrying out all the usual analyses of the geometry of international trade in terms of a three-dimensional model. It is enough to know that at any point the analysis can validly be extended in this way; we can return for most usual problems of theory to a two-dimensional model: once it is seen that the difficulties which result from altering leisure preferences can be validly introduced into the geometry and resolved there, we can regard our normal failure to treat them as merely a simplifying technique and not as a vicious and irremediable weakness in the theory.

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Charles Davenant and the East India Company

By David Waddell

In the many-sided East India controversy of the 1690's the most important writer on the side of the " Old " Company was Charles Davenant (1656–1714). His " Memorial on the East-India Trade " of February 1696[1] defended joint-stock organisation for the trade against the arguments of the proponents of a " regulated " company; his *Essay on the East India Trade* (1696) opposed the protectionist proposal to prohibit the wearing in England of Indian textiles; and his *Discourses on the Publick Revenues and on the Trade of England* (1698), *Part II*, answered the bullionist arguments against the East India trade, set out by John Pollexfen in *England and East India Inconsistent in their Manufactures* (1697).

Davenant's steady support of the Company on different issues combined with the knowledge that he was in some way connected with the Company has led to accusations of mercenary writing. A consideration of the arguments used and views expressed by Davenant in his East India writings yields no definite conclusion in this matter. On the one hand, most of these arguments and views are consistent with those expressed in Davenant's writings on other subjects. The contention that the East India trade was beneficial to England was a deep-rooted conviction of Davenant's before he became involved in East India controversy.[2] The arguments against the protection of English textiles, though easy to attack, were not unreasonable applications of the balance of trade theory which dominated most of his writings. The concern for the security and stability of the trade, which underlay his opposition to the loose organisation of a " regulated " company, clearly derived from the fear of Dutch rivalry, which was a prominent characteristic of all of Davenant's work. It thus seems possible that Davenant could have written his East India pamphlets without financial inducement. But on the other hand, the pamphlets provided such an able statement of the Company's case, that the assumption of some of Davenant's opponents that he was in the Company's pay[3] cannot be dismissed as unreasonable.

An examination of the evidence on Davenant's connection with the Company from its records throws a little additional light on the matter. The first reference to Davenant in the Court Minutes shows that in

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[1] B. M. Harl. MS. 1223; Lond. Univ. Goldsmiths' MS. 59. Davenant printed almost all of this in his *Discourses* of 1698: see *Political and Commercial Works of Charles D'Avenant* (ed. Whitworth, 1771), II, pp. 126–37.

[2] See *Two Manuscripts by Charles Davenant* (ed. Usher, Baltimore, 1942), p. 56.

[3] See, for example, *An Answer to a Late Tract, entituled, An Essay on the East India Trade* (1697), p. 25.

1697 he offered to serve the Company in India in any capacity they deemed suitable. The Court acknowledged his ability and experience in matters of trade and commerce, and the " good service " performed by him to the Company, and they promised to take his wishes into consideration.[1] But although Davenant kept himself in the Company's eye by publishing his *Discourses of the Publick Revenues* in 1698, almost eighteen months passed before his name again appeared in the Company's minutes.

Meanwhile, the " New " Company had been set up with an entitlement to over 80 per cent. of the Indian trade, in accordance with the provisions of the East India Act of 1698. The " Old " Company, now entitled to only 15 per cent. of its former monopoly, had received notice to wind up its affairs under its existing charter by 1701. One of the provisions of the " New " Company's charter authorised it to maintain ambassadors at the Indian courts, accredited by the Crown on the Company's nomination; and one of its first acts was to appoint Sir William Norris, who at the end of 1698 was preparing to leave on his embassy.

The " Old " Company thought that the only possible reason for Norris' mission must be to embroil it with the Indian Government, and decided to send out a special agent. On 25th November they selected Davenant, who was well informed on all matters relating to the new Act, as well as on the Company's affairs in general, to act as a sort of legal adviser to the Company's agents in India on their position and " just pretensions " under the new regulations.[2]

But although Norris sailed early in 1699, Davenant did not follow. The Company decided to keep him in England until they had been able to get legislation through Parliament which would avert their impending dissolution, by enabling them to continue as a Company after 1701 for the purpose of managing their 15 per cent. of the trade. After a setback in 1699 their Bill became law in April, 1700.[3]

A year before this the Court had voted Davenant 20s. per day from the previous November for as long as he was retained.[4] He had thus been in the Company's pay for some eighteen months, when the passing of the Act of 1700, which immensely strengthened the Company's position and bargaining power, decided the Court to send him out immediately. Armed with the new Act, Davenant was to explain all about it to the people on the spot, so that they could counter any false claims on the part of the " New " Company. The Court also thought that further use might be made of Davenant's qualifications in civil law, by having him assist in the establishment of Admiralty Courts in India.[1] He was to be paid £1,500 at once and £1,000 a year for three years.[2]

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[1] Commonwealth Relations Office, East India Company Court Minutes, vol. 37, p. 183 (18th June, 1697).

[2] Court Minutes, vol. 37, p. 350; East India Company, MS. Letter Book No. 10, pp. 154–5 (30th December, 1698).

[3] MS. Letter Book No. 10, p. 177 (5th May, 1699). There may have been another motive for retaining Davenant. He was elected to Parliament in 1698, and may have been able to help in getting the Bill through. He was in touch with the Bill's promoters in 1699 (see Huntington Library, MS. Journal of James Brydges: 2nd, 9th, 12th, 13th, 24th March; 12th, 14th April, 1699).

[4] Court Minutes, vol. 37, p. 394 (24th April, 1699). Some of Davenant's receipts, both for instalments of this salary and for small loans from the Company, are in Bodleian Library, MS. Rawl. D 747, ff. 195–201.

Davenant was given very little notice of his sailing date, and on 1st May complained that he could not be ready in time. The Court decided that his ship could not be delayed and it sailed without him, the Company accepting his excuses the more readily because they had good reports of the confident way in which their agents in India were handling the problem of the " New " Company.[3]

It is likely that Davenant had reasons other than those expressed both for his initial offer, and for his ultimate refusal to go to India. In 1698, in his *Discourses of the Publick Revenues*, he explained his offer in terms of his zeal for the public service and his desire to see how his theories of trade worked out in practice.[4] But he was well aware that going to India was a hazardous undertaking for a middle-aged Englishman, and his offer seems rather indicative of despair. He had been out of employment since 1689, and had failed in repeated attempts at reinstatement in the revenue service. He was probably in acute financial difficulties with little prospect of improvement.[5]

His eventual refusal to go in April, 1700, may be attributed less to the short time allowed for his preparations than to his improved political prospects. His first purely political pamphlet, *A Discourse of Grants and Resumptions*, published a few months before, had won him some prominence among the Tory opposition. The dismissal, a few days before Davenant's refusal, of Somers, the last member of the Whig junto remaining in office,[6] was an important victory for his party and probably gave Davenant renewed hopes of official employment, although these were not in fact realised for over two years.

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[1] Davenant had been a member of Doctors' Commons since 1675. On the question of Admiralty Courts see A. B. Keith, *Constitutional History of India* (1936), pp. 38–41, 47, 49.

[2] Court Minutes, vol. 38, p. 129 (22nd April, 1700); MS. Letter Book No. 10, pp. 285–6 (25th April, 1700). N. Luttrell (*Brief Historical Relation of State Affairs* (1875), IV, p. 637) is wrong both on the amount of the salary and the purpose of the mission.

[3] Court Minutes, vol. 38, p. 134 (1st May, 1700); MS. Letter Book No. 10, pp. 295–6 (4th May, 1700).

[4] *Works* (ed. Whitworth), II, p. 159. The Company, however, showing the business man's distrust of the theorist, expressly stated in their instructions to their agents that Davenant was not to " intermeddle in any mercantile affairs " (MS. Letter Book No. 10, pp. 155, 286).

[5] See G. Davies and M. Scofield, " Letters of Charles Davenant ", *Huntington Library Quarterly*, IV (1941), p. 311.

[6] Davenant's political opposition to the Junto, to which the " New " Company group was politically allied (see R. Walcott, " The East India Interest in the General Election of 1700-1701 ", *English Historical Review*, LXXII (1956), p. 223), may have motivated his defence of the " Old " Company in 1695 (*Two Manuscripts by Charles Davenant*, p. 56) and possibly also in the " Memorial " of 1696. But it cannot be considered as an important element in his two published works, which were concerned with attacks on the trade in general, rather than on the " Old " Company in particular.

It is not clear whether Davenant's refusal to go meant the immediate loss of his 20s. per day, or whether payments continued until his last transaction with the Company in 1702. At a Court meeting in July of that year his whole connection with the Company was reviewed, and the Court decided, after taking all the circumstances and " several other matters " into consideration, to sponge his debts to the Company, amounting to £875, and to pay him a further £125 to make it up to the round thousand.[1]

It seems very likely that Davenant's East India writings were responsible for this generosity, and that the " good service ", which helped to gain favourable consideration for his application of 1697, and the " other matters " considered in 1702, included his pamphlets. On the other hand, the Company made no move to employ him until almost a year after his last words on the subject had been published, and then they had a quite definite job for him to do. It is not impossible that Davenant received unofficial and unrecorded payments from the Company. It is not unlikely that he wrote on the Company's side at least partly in the hope of a reward from them. But from the available evidence it may still be reasonably deduced that his principal motive was a concern for the balance of trade.

University College of the West Indies.

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[1] Court Minutes, vol. 39, p. 17 (10th July, 1702).

Multiplier and Velocity Analysis: An Annulment

By G. C. ARCHIBALD

The purpose of this note[1] is to show that Mrs. Lutz' marriage between multiplier and velocity analysis[2] should be annulled on the grounds of non-consummation.

1. The object of her paper is " to show that velocity can be explained in terms of a multiplier sequence, found by a process analogous to that by which the investment multiplier sequence is found, but based on a hypothesis about the nature of the hoarding function which . . . gives us the result that velocity tends towards stability unless the function shifts ".[3] She argues, in other words, that whereas most multiplier theorists have produced velocities that varied in the course of a multiplier sequence founded on a stable consumption function, she can produce a perfectly good, even a better, multiplier, based on a stable hoarding function, and one which, furthermore, is not inconsistent with the hypothesis of a stable consumption function. She assumes throughout that the argument can be carried on in terms of money flows, there being no price changes and no relevant changes in income or assets distribution. The assumption of constant prices when income is increasing requires that there be unemployed resources.

She opens her argument by presenting a static " new money multiplier " in which the multiplicand, instead of being investment, is new money created in the period, and the multiplier, instead of the reciprocal of the propensity to save, is the reciprocal of the propensity to hoard. She does little, however, with the static formulation, and turns at once to the problem that a multiplier sequence of the type $1, \alpha, \alpha^2, \alpha^3, \alpha^4, \ldots$ (where α, the propensity to consume, is stable and lies between 0 and 1) implies an unstable velocity, and has therefore caused multiplier theorists to conclude that velocity has no explanatory value. In a multiplier sequence of this sort, the consequence of a single injection, e.g., of investment, financed by the creation of new money, is that income rises sharply, then falls away to its old level. Hence the " velocity per income period of the new money falls from one to zero".[4] Continued injections of new spending would be required to maintain an increased level of income, and, so long as they were financed by the creation of new money, this would mean a steadily falling velocity. Mrs. Lutz complains,[1] with apparent justice, that this construction implies a curious hoarding function : namely, that in each of the periods in which income is *falling* (the second and all subsequent periods) people *add* to their hoards ; in other words, a hoarding function analogous to the saving function.

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[1] Which is based on a paper read to Professor Robbins' Seminar at the London School of Economics. I am indebted to the members of the Seminar for their comments on, and criticisms of, my paper, and particularly to Professor Robbins, Dr. A. W. Phillips, and Mr. B. Corry.

[2] Vera Lutz, " Multiplier and Velocity Analysis : a Marriage ", *Economica*, N.S., Vol. XXII, No. 85, February 1955, pp. 29-44.

[3] Ibid. p. 29.

[4] Ibid. p. 33.

This discussion prepares the ground for the introduction of her dynamic formulation, the purpose of which is to show that a plausible multiplier sequence can lead to a stable velocity. Whether it does or not is seen to depend on the shape attributed to the hoarding function. Mrs. Lutz suggests that, rather than being analogous to the saving function, it is of the shape implied by the Cambridge real balance equation, such that "the *total hoards outstanding*, but not additions to hoards in each income period, would bear a fairly constant ratio to income",[2] i.e., that changes in hoards will only be made when income is changing. Thus, in equilibrium, when income and hoards are constant, velocity must be constant too. The hoarding function is $H_t = h(y_{t-1} - y_{t-2})$; in other words, the addition to hoards made today (H_t) is a constant proportion of the difference between the income of yesterday and that of the day before. For the injection of a single unit of new money we therefore have the income equation

$$y_t = y_{t-1} - h(y_{t-1} - y_{t-2}) \begin{bmatrix} y_0 = 0 \\ y_1 = 1 \end{bmatrix}$$

We may express this in another way : hoards are adjusted, in each period, in such a fashion as to bring their total amount into the desired relationship with the period's income ; so long as some adjustment is necessary, the spending, and income, of the following period will be different ; when adjustment is no longer required, hoards, velocity, and income are constant, i.e., the system is in equilibrium. Thus the income equation given above produces diminishing oscillations in response to an initial injection, without ever taking on a negative value, and finally settles down at $\frac{1}{1+h}$ (as long as $0<h<1$) which is the value of Mrs. Lutz' multiplier or velocity. This result, that velocity does settle down at a positive level, i.e., that income increases permanently instead of returning to its initial level as in the $1, \alpha, \alpha^2, \alpha^3, \ldots$ series is, of course, the result of the particular form given to the hoarding, and hence to the income, equations. By solving for H and summing, or by simple subtraction, we also see that, if $\frac{1}{1+h}$ of the newly injected money continues to circulate once in each period in the formation of income when the system has found its new equilibrium, then the remainder, $\frac{h}{1+h}$, goes permanently into hoards, fulfilling the implicit equilibrium condition that actual hoards equal desired hoards, hY. Mrs. Lutz therefore claims to have justified the results (permanently increased income ; stable velocity) which velocity theory gives us to expect.[1] She ends by claiming certain advantages for the " new money multiplier " which we shall discuss below.

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[1] Ibid. p. 34.

[2] Ibid. p. 34, her italics.

2. My case against Mrs. Lutz' paper is that she overlooks, or obscures, certain well known and fundamental distinctions between different aspects of money and income. I shall now attempt to bring this out.

Let us start with the static version of her " new money multiplier ", which is obtained by dividing Investment and Consumption into two parts, one induced and the other equal to the amount of new money created in the period[2] (which is the multiplicand). The multiplier is the reciprocal of the propensity to hoard.[3] Two points at once arise. The first is that the identity given by her division of investment and consumption is : Income$\equiv$New Money$+$Induced Spending. Thus, if no new money is created in the period, her multiplicand is zero and income is zero. Mrs. Lutz defends this result as the counterpart of the practice, in ordinary multiplier theory, of ignoring old investment, as she ignores " old money ", but there is an obvious difference. The second point is whether the propensity to hoard of Mrs. Lutz' multiplier can be identified with the propensity to save *minus* the propensity to invest of Professor Lange's combined " spending multiplier "[4] with which she compares it. She at first objects to the identification,[5] but later admits that they are the same if it is assumed that injections of autonomous expenditure are synonymous with injections of new money.[6]

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[1] Ibid. p. 36.

[2] Ibid, p. 30. It is necessary to stress her actual words, " new money created in the period". It has been suggested to me that she should be understood to mean " money added to the active circulation in the period ", whether newly created or drawn from idle balances. The objections to this view are that it is not what she says, and, in any case, is not particularly helpful. The difficulties of distinguishing between active and idle balances are acute, if not insuperable. Furthermore, if income increases with a constant money supply, it is *necessary* that idle balances be drawn down and more money put into active circulation. This movement, however, is induced, and not suitable for treatment as an autonomous multiplicand.

[3] Mrs. Lutz' propensity to spend, γ, equals $\frac{I_b + C_b}{Y}$ (where the subscript b signifies induced spending), and her multiplier is $\frac{1}{1-\gamma}$ with new spending, $I_a + C_a$, for multiplicand. On p. 31 she writes $\frac{1}{1-\gamma}=\frac{I_b + C_b}{Y}$; this must be a slip.

[4] Oscar Lange, " The Theory of the Multiplier ", *Econometrica*, 1943. His combined spending multiplier is $\frac{1}{1-(\alpha+\beta)}$ where α is the propensity to consume and β the " propensity to invest ".

[5] Ibid. p. 31, note, and p. 42.

[6] In which case her criticism of the multiplier $\frac{1}{1-(\alpha+\beta)}$ (the multiplicand is autonomous expenditure) on the grounds that the propensity to invest, as well as the propensity to consume, have to be assumed constant, applies with equal force to her own formulation.

If new spending is managed without new money, however, Mrs. Lutz' multiplier is of no service because its multiplicand is zero; if new money is injected without new spending, it is again of no service because it is, in the first instance, an investigation of the money market that we require. Nowhere, however, does she distinguish a money market for separate treatment.

We find from her criticism of the hoarding function apparently implied by a multiplier sequence of the type $1, \alpha, \alpha^2, \alpha^3 \ldots$ that the distinction between saving and hoarding is also obscured. When she complains that, in such a series, people are adding to their hoards in periods in which income is falling, she overlooks the implicit *ceteris paribus* assumption that the rate of interest remains constant. If this assumption is relaxed, income may well settle down permanently at a new level in response to a single initial injection, in which case the velocity of the new money does not fall to zero (it is obvious that much depends on the shape of the liquidity preference function, which Mrs. Lutz does not discuss)[1]. But when the series is presented in its very crude and simple form, abstracting entirely from the securities market and the rate of interest, nothing is said about how the new savings are held or disposed of ; and, until this gap is filled, nothing can fairly be inferred from the series about the hoarding function it implies. The gap, of course, cannot be filled until the rate of interest is taken into account, but interest in fact never appears in Mrs. Lutz' own hoarding function. " Hoarding " itself, indeed, is a term which she does not define, save in the sense of " not spending ", until the tenth page of her paper. There she speaks of " income which is not hoarded (i.e., is available for the remaining purposes of spending on consumption and investment and, possibly, repaying bank debts) ".[2] If we overlook the bank debts, we may now guess that hoarding consists of accumulating non-real assets i.e., money or near money securities, but it is not really clear whether using saved money to purchase securities (lending money) is regarded by Mrs. Lutz as dishoarding or not. She does not, indeed, appear to distinguish between decisions to save out of income and decisions as to how to hold the accumulating wealth, or to allow for the possibility that people need not hold all their savings in money form—if she did, she would not so quickly conclude that multiplier analysts have attributed to the money-hoarding function a shape analogous to that of the saving function.

My principal criticism, however, is that *she has aggregated the goods and the money markets ;* and I submit that this is an illegitimate aggregation which is the cause of much obscurity. Further, she appears to overlook the distinction between those variables which depend on income and those which depend on asset structure. Thus in her comparison of her new money multiplier with other multipliers she admits, in a footnote, that the former can be criticised on the grounds that it matters into whose hands the injection of new money first comes—whether the recipients have a high or a low propensity to hoard. She writes:

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[1] The familiar depression case, of an elastic demand for money to hold, involves a constant rate of interest and the sort of hoarding function to which Mrs. Lutz objects ; but in this case the hoarding behaviour is explicitly assumed and her objection is not valid.

[2] Ibid. p. 39.

> "The problem created by the fact that different groups have different propensities (whether to hoard or to consume), so that the average for the community as a whole alters with changes in income (or assets) distribution, is, however, common to all multiplier analysis which abstracts from such changes. All simple multiplier formulæ which treat the economic system in terms of single aggregates are, that is to say, equally rough instruments, and liable to be misleading if we let the appropriate qualifications slip from our sight."[1]

It is well known that aggregation problems are involved in the concept of a consumption function, but it does not seem to me to be possible to dismiss the question of whether new money is released on the money market by the purchase of securities, or on the goods or factor markets by the purchase of goods or services, as a parallel aggregation problem. The distinction is fundamental ; it is to meet it that we have the two *distinct* concepts of a consumption function and a liquidity preference function, and it seems to me that to try to put the two together, as she does, is a retrograde step. It is tantamount to saying that there is no real difference between monetary and fiscal policy. She does, indeed, recognise, in another footnote[2], that, if the new money is released by central bank purchase of securities, there may be no income creation if " the marginal h is infinite "; but she does not draw the proper conclusions about her method of aggregation. At the same time, she is here relating what the recipients of the new money do with it to their income rather than to their assets structure. Her h is defined purely in relation to income ; a different equation is required to deal with the exchange of securities for money, and the rate of interest, but these are matters she consistently ignores.

London.

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[1] Ibid. p. 43, note 2.
[2] Ibid. p. 38, note 2.

On the Calculation of Tax Burdens[1]: A Rejoinder

By A. R. Prest

Dr. Conrad's article covers two different topics. First, he summarises the methods he has recently[2] used to measure the effects of the Government tax and expenditure structure on the level and distribution of U.S. incomes in 1950. Second, he tries to argue that the criticisms I levelled[3] at various authors in this field do not apply to his own methods. I propose to concentrate mainly on the latter, to show that he has not rebutted my criticisms and that therefore the basic data (" first impact effects " in his terminology) which he feeds into his estimating processes are valueless. I shall only deal *en passant* with the methodology of his approach.

First of all comes a point which is repeated a number of times and which, I think, obscures the real issues. Dr. Conrad seems to think that, in some way or other, the notion that factor supplies to the economy are rigidly fixed is vital to my argument and that because his model shows how a given tax structure may affect both the distribution of income and its level, he has successfully overcome my objections to the methods of other writers.

This is a misapprehension. The various writers whose arguments I examined concentrated on the measurement of the redistribution of a given real income brought about by the tax and expenditure system. They (and I) recognised that taxes affect the level of real income[4]—and for that matter the rate of growth of income and perhaps even the length of Uncle Sam's whiskers—but they (and I) were content to confine their attention to the distribution aspect only. If Dr. Conrad thinks he has a method of measuring the effects of taxes, etc., on both the distribution (primary and secondary) and the level of income, that is a matter of importance. And it *may* even be that this is what everyone ought to have been trying to do all along. But even if this is true, the most that follows is that everyone has set his sights too low until now and not, in any sense, that the logic of those who tried to deal with a narrower problem was necessarily at fault.

It would take too much space and time to discuss here whether one ought to be working on a grand scale in this field and producing out of one large sausage machine all the answers to all the questions anyone has ever wanted to ask. But perhaps I can express a private doubt about the *a priori* wisdom of such a course and a strong preference for the piecemeal approach. Running before walking is not usually a profitable occupation.

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[1] A. H. Conrad, " On the Calculation of Tax Burdens ", *Economica*, November 1955 (henceforth called *second article*).

[2] A. H. Conrad, " The Multiplier Effects of Redistributive Public Budgets ", *Review of Economics and Statistics*, May 1955 (henceforth called *first article*).

[3] A. R. Prest, " Statistical Calculations of Tax Burdens ", *Economica*, August 1955.

[4] cf. Musgrave *et al.*, " Distribution of Tax Payments by Income Groups ", *National Tax Journal*, vol. IV, no. 1, March 1951, p. 6, for a particularly clear statement.

However, I shall confine myself here to the question whether, even if it is assumed that Dr. Conrad's objection is " right ", his statistical apparatus is so different from that of all his predecessors that my criticisms (which he himself admits apply to them[1]) do not touch him. As far as I can see he has not produced a single reason to show why he should be so exempt. In several places Dr. Conrad makes it clear that his new set of calculations is superimposed[2] on what he calls first-impact calculations. It can be taken therefore that if there are logical deficiencies in these first-impact calculations, the superstructure itself has no statistical validity, although, of course, that does not necessarily rob it of interest as a theoretical exercise.

The basic argument in my article was that the assumption that indirect taxes cause price increases exactly equal to the rate of tax could only be justified either if the supply schedules of the taxed commodities were infinitely elastic or if demand were perfectly inelastic. Similarly, the assumption that a direct tax rests where it is put implies either that the supply of factors is completely inelastic to any given industry or, alternatively, that demand for the product of that industry is infinitely elastic. It seemed to me that the most likely assumptions which could be ascribed to the authors of these studies were the perfect elasticity of supply of goods in the case of indirect taxes and the perfect inelasticity of factors in the case of direct taxes, and I suggested that these two were incompatible with each other. Furthermore, it can quickly be seen that any other combination of the above assumptions produces illogicalities. Finally, these basic contradictions are tied in with monetary problems, too.[3]

Now Dr. Conrad's actual " first-impact " calculations as used in his first article were first published in one of the works[4] to which I referred in my article and are, as far as I can see, just as much subject to the above criticisms now as when I wrote my article. Unless and until he can either refute these criticisms or produce some " first-impact " calculations derived in some other way, I cannot see that his subsequent manipulations of these figures can produce anything at all meaningful. One can hardly hope to get the right output if the input is known to be wrong ! In fact, Dr. Conrad is positively eager to show in his second article that he is combining exactly those assumptions which I attributed to the authors of these exercises. In the last paragraph of p. 347 he categorically states that he assumes a highly elastic supply curve for labour in order to justify the assumption that excise taxes raise prices. Although he does not specifically say so, this presumably refers both to the overall supply curve of labour and those for individual industries or occupations. In the very next paragraph, when dealing with direct taxes, he produces a variety of reasons why he thinks the supply of labour to any given industry or occupation is inelastic. He really cannot have it both ways !

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[1] *Second article*, p. 348, " The methods which Dr. Prest criticised have not been defended *per se*—I doubt that they can be in the face of this analysis. . . ."

[2] e.g. *Second article*, p. 345, " It rests upon the assumptions made about the initial incidence of the taxes and benefits ".

[3] Since my article was written another work on this subject has appeared (A. M. Cartter, *The Redistribution of Income in Postwar Britain*, Yale University Press, 1955). It is argued (p. 21) that the assumption of indirect taxes being passed forward in their entirety can be justified by postulating that the Government immediately utilises the proceeds of the tax from any one commodity to buy just sufficient of that commodity to ensure that output remains unchanged. Hence prices can be thought to rise by the exact amounts of indirect taxes without requiring either supply to be perfectly elastic or demand perfectly inelastic. Such a supposition is obviously a very tall order but it might *in extremis* be satisfied. However, even if this is so, there is still a fundamental difficulty. For if it is assumed that the Government immediately spends the proceeds of taxation on goods and services it can hardly be argued (as it is on pp. 17–18) that direct taxes have no effects other than simply reducing the incomes of those on whom they are placed.

[4] " Redistribution through Government Budgets in the U.S. 1950 ", *Income Redistribution and Social Policy*, ed. by A. T. Peacock, 1954.

There are other points on which I could comment further : the definition of a " neutral " distribution, the concentration on the supply schedules of labour to the exclusion of those of other factors of production, some misunderstanding about my own suggestion of what is possible in this field, and so on. But if I am right on the central issue, it is unnecessary to do so.

Finally, I should say that I regard the core of Dr. Conrad's first article as strengthening my general argument. What he has clearly demonstrated is that there are so many further complications due to the various possible rounds of redistribution that I am tempted to argue more than ever that the task of measuring the redistributive effects of taxes in any one year is a hopeless one.

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Book Reviews

Country Banking in the Industrial Revolution. By L. S. PRESSNELL. Oxford, Clarendon Press; London, Cumberledge. 1956. xvi + 591 pp. 70s.

In this encyclopædic work Dr. Pressnell has synthesised an enormous mass of scattered indications of the nature and quality of country banking in England and Wales from its beginnings until about 1830. The bank records which he has used have been reduced by time to a compass described as manageable by a single enquirer—though few others would have found them so—but their continuity has almost wholly disappeared. To supplement these data, the Bankruptcy Court and County Record Offices have been searched, and the references quoted in the footnotes and "List of Principal Sources"—there is no full bibliography—testify to wide reading. The effort involved must have been immense; the resulting blend of detailed illustrations and careful argument constitutes the most considerable contribution for many years to our knowledge of British banking.

The book is divided into four parts of unequal length. The first 75 pages deal mainly with the origins of country bankers; the next 60 with their relations to London banks and to each other; and the last 70 of the text with economic fluctuations, bank failures, and banking reform. The central three-fifths of the book are devoted to an extended discussion of note-issues, reserve policies, resources, assets, and—in much detail—the financing of industry, local authorities and public utilities; 30 appendices include many summaries from bank ledgers. There is a first-class index. Little more can be done in the face of such richness than to pick out one or two of the many tempting topics surveyed.

Chapter III gives precise form to the belief that country banks rarely arose spontaneously, by showing that they most commonly developed from certain types of industry (especially mining and textiles), from "money-scrivening attorneys,", from retailers or wholesalers making extensive remittances, and from revenue collectors.

Chapters IV and XIV discuss the functions of the London agents of the country banks, and of the bill market. Here Dr. Pressnell argues (p. 94) that King was wrong in suggesting, rather ambiguously, that after 1797 London bankers ceased to allow interest on country banks' balances, and that the latter therefore shifted their funds into bills. In fact, the crisis of 1793 made country banks prefer to keep cash at home rather than balances in London; after 1797 this was reinforced by growing local demands for accommodation, plus the preoccupation of the London banks with Government securities rather than commercial discounts. A lack of detailed evidence for 1802–3 leaves it uncertain whether, as two contemporary writers—Atkinson in 1802 and Wheatley in 1803—asserted, country banks had recently gone rather further than this, and changed from holding balances in London to borrowing from their London correspondents, and through them from the Bank of England.

Appended to Chapter VI on bank-notes and deposits is an admirable analysis of the defects of the stamp-duty returns as a basis for calculating the note-issue. Dr. Pressnell inevitably does not attempt any global calculations of his own. Instead he provides some tables (e.g. VIII, XXIV, Appendices 2 (*a*), 3 and 5 (*a*)) giving some individual issues. Unfortunately, these relate mainly to the later years of the period, and are insufficient to give us any clear impression of developments. (Unfortunately, too, the exclusion of Scotland rules out the complete series surviving in the history of the Dundee Bank.) Perhaps in a second edition Dr. Pressnell could add some discussion of the confidence felt by the public in country bank-notes, and especially of its apparent fluctuations with the Trade Cycle, for which some evidence is to be found in the Law Reports.

Chapter VII discusses what determined the size of country banks' operations, especially their cash reserves, and other liquid assets. Wood's belief in the significant control exerted by the Bank of England over the liquidity of the banking system finds support from Dr. Pressnell, who cites the close parallelism between the rate of interest in London and the provinces.

Only half the book has yet been touched on, but one more comment must suffice. Chapter XV uses bankruptcy statistics to make an elaborate survey of bank failures from 1750 to 1830, relating them closely to economic conditions. Incidentally, Appendix 101 to the 1832 Report is shown to be seriously misleading. Only one slightly disquieting thought arises: Dr. Pressnell mentions that Livesey & Co., although also bankers, were gazetted as calico manufacturers. Is there a possibility that other less notorious bank failures were similarly disguised?

Every chapter of this important book is a happy blend of close analysis and telling examples. The fact that a few minor questions emerge as one reads it does not in the least obscure its very great scope and value. Seldom can a pioneer effort have produced so solidly established a standard work.

J. K. HORSEFIELD.

Planification et croissance économique des démocraties populaires. By J. MARCZEWSKI. Presses Universitaires de France, Paris. 1956. 550 pp. + bibliography (2 vols.). Fr. 2,100.

The countries of eastern Europe were, by and large, backward, depressed, unable to break out of the vicious circle of poverty, underinvestment, rural overpopulation. Those who governed these countries between the wars were aware of the need for radical change, but their efforts, though often honest and well meant, made little difference. Yet since the war, despite oppressiveness and inefficiency, despite the subservience of the new regimes to the U.S.S.R., problems which were quite intractable before the war seem to be on their way to solution. Why is this so? This question is the basic theme of Professor Marczewski's book, and its importance is far wider than the geographical area to which it refers, since many if not most of the problems which he analyses are common to underdeveloped countries in general.

Of the book's many high qualities, it is necessary to mention one in particular, which gave a rare pleasure to the reviewer: Professor Marczewski's style can only be called admirable. Subtle arguments and interweaving patterns of cause and effect are presented with truly enviable clarity and simplicity. Relatively little space is devoted to statistical analysis, and one might have perhaps seen a closer and more critical analysis of some of the official claims.

However, it is refreshing to see an original mind at grips with general principles, explaining general trends of historical and economic development. His basic case stands, regardless of minor criticisms which can be directed at his statistical base.

The analysis is the more penetrating because Professor Marczewski, while clearly hostile to totalitarianism and so to much of what is being done in eastern Europe, is first and foremost a scholar, and one who has closely studied the special difficulties of eastern European countries. In analysing the pre-war experiences of these countries, he has many stimulating and disturbing things to say about the inapplicability of western economic theories, and the damage often done by western policies or western neglect, to the economies of Poland, Rumania and the rest. Looking back, one sees that western advisers of the period failed to grasp that their advice, in the given context, was at best irrelevant and often disastrous, notably in the case of the " sound money " policy pursued in Poland. Inflation was (and is) an inevitable accompaniment to any steps to cure the deep-seated diseases of the economy, though in its turn it led to the creation of additional obstacles to development and to restrictions of trade and exchanges. The uncomfortable logic of the argument is that some kind of dictatorship with a " developmental " ideology was necessarily involved in any effective solution, and Professor Marczewski has the courage to face up to this logic, instead of evading it by comfortable generalisations.

In considering the achievements of the " peoples' democracies ", the author provides a first-rate account of the budgetary, banking and planning systems, and is refreshingly conscious of the limitations of state action, without in the least understating the coercive powers of the Russian-backed governments. He is unsparing in his criticism of weaknesses. These are everywhere greatest in agriculture, because of the confusion caused by the class war against the most efficient producers (" kulaks "), the low priority of agriculture in general, the low prices paid for produce and the general inapplicability of Soviet-type planning to farm problems. Overconcentration in heavy industry, especially in the period of maximum subordination to Moscow (i.e. the years after 1948), went altogether too far; there was waste, disproportions arose, and there was a sizeable fall in living standards. Yet despite these weaknesses, industrial production has risen rapidly, and the problems with which pre-war statesmen wrestled so ineffectually are being more or less effectively tackled. While the system is often oppressive, and basic decisions are little influenced by public opinion, it makes possible a necessary concentration of resources on investment, in a way probably not open to a system dependent on votes or dominated by landed or other sectional interests. The almost exclusive preoccupation of Marxists with economic growth happens to suit the needs of backward east-European countries. No doubt Professor Marczewski would be delighted if an alternative road could be indicated, which would avoid the suffering and waste involved in the " Soviet " solution.

A short review cannot possibly do justice to a complex and many-sided argument. One can only wholeheartedly recommend this book to western economists, who will see many of their long accepted beliefs critically analysed in an unfamiliar yet important setting. It is clear that there has been too much neglect of French scholarship in the field of east European studies.

A. Nove.

The Theory of Fiscal Economics. By EARL R. ROLPH. University of California Press, Berkeley and Los Angeles. Cambridge University Press. 1954. xiv + 310 pp. 34s.

A serious student of the recent attempts to develop a general equilibrium theory of taxation could hardly ignore the distinctive but, in the reviewer's opinion, misleading theory of Professor Rolph. This volume contains a full statement of this theory, intelligently and often cogently argued, and there is much else besides. The book is not a text-book in the ordinary sense but a set of essays on specialist topics in public finance arranged roughly according to the traditional order of subjects.

The first four chapters set the stage. After a contentious introduction, the author settles down to an unexceptionable discussion of the place of the government in the economy. Then, in Chapter IV, the peculiar merits of the book are first encountered. Professor Rolph produces a convincing argument for the view that national product should be computed at market prices. Certainly no specialist in social accounting can be entirely happy with the *simpliste* arguments for deducting particular taxes from the national product total, but the particular importance of Professor Rolph's argument is his rejection of the strongest reason for deducting taxes on expenditure, viz. that these are shifted while income and other direct taxes are not. This theory, he maintains, " confuses causation with computation . . . national net value product and national income, being stated in money terms, increase when a general rise in prices occurs, whatever the reason may be for the rise " (p. 11). The second reason for rejection is simply that this theory of tax shifting is just wrong—and this brings us to Rolph's particular contribution, or, dare one say, obsession.

There are two parts to his theory. The first is a polished restatement of Edgeworth's attempt to generalise the theory of sales tax incidence. The conclusion is that in a general equilibrium setting, a tax imposed on Commodity A may, through changes in factor prices, and through income effects, change the price of Commodity B; this poses a nice problem for those who persist in attributing any meaning to the famous excess burden argument. Quite apart from its dubious welfare assumptions, the assumption that the price of the untaxed commodity is independent of the price of the taxed commodity is untenable. The second part analyses a general sales tax. If a general sales tax is imposed, *and the proceeds are not spent or are ignored*, then it will be shifted to factors and not forward to consumers. This is easily proved by Rolph by Robertsonian period analysis. It is wrong, therefore, to persist in using a partial analysis of sales taxes in order to prove the general case; Professor Rolph is quick to see the nice problem he poses for Keynesian theorists who adopt the Classical conclusion in fiscal policy models, where sales taxes are used to bring about a budget surplus.

The obvious reaction to this thesis is to go over the assumptions again, and we soon find that the result depends entirely on the budgetary assumptions. It seems sensible to argue that in a general equilibrium case it is impossible to ignore the use of receipts, even if they are hoarded; alternatively, if there is no change in receipts, then one must consider the substitution of the sales tax for some other tax or constellation of taxes. Rolph will have none of this. We have to separate taxes from expenditures for two reasons; firstly, because we cannot talk about the effects of taxes alone unless we abstract from other effects, and secondly, because this dichotomy is firmly implanted in the finance official's mind. The answer to these points is that we require a fiscal theory that will be useful as well as correct. Each budget situation is unique, and it is the combined effect of receipts and payments which must be taken into account in demonstrating whether or not a particular budget is consistent with the fiscal objectives. The fact that these effects may be difficult to determine is no reason for beginning with a misleading first approximation.

The reviewer's excuse for devoting so much attention to two chapters is that they contain the most original contribution of Professor Rolph. This is no reason for ignoring the rest. Chapter V on " The Monetary Basis of Fiscal Theory " is something of a curiosity; surely Professor Rolph does not believe that the Keynesian fiscal model reproduced in this chapter is representative. There are two tough chapters on the incidence of import duties, and three final chapters discuss the effects of taxation on the incentives to work and investment and on risk-taking.

ALAN T. PEACOCK.

Linear Aggregation of Economic Relations. By H. THEIL. North Holland Publishing Company, Amsterdam. 1954. xi + 205 pp. 36s.

The phrase, " the aggregation problem " has appeared fairly frequently in economic writings during the past few years, but it has not been easy from a perusal of the literature to find out precisely what it means and why aggregation is an important matter for economists to occupy their time with. Professor Theil in his new book seeks to satisfy both these demands for information, and to present some new results which are worthy of the attention of economic theorists. In so far as it is the first major work in the field in English, it is to be welcomed although at times the argument is involved, and the mathematics requires careful reading.

Perhaps, the easiest way to describe the aggregation problem is by reference to the mathematics in which Σ's appear at the rate of about one to a page. Given a large economic model with many equations and variables one may consider a smaller model in which the variables and parameters are simple or weighted sums of the variables in the large model. Assuming that in both cases the endogenous variables may be solved in terms of the exogenous variables, the question arises as to whether the differences between the predictions of the two models are significant. Thus, one has to compare the sums of the predictions of the microvariables in the micromodel with the predictions of the sums of the microvariables in the macromodel. This is so whether one is trying to derive a macrotheory from microtheory, or testing microtheory for its compatibility with a macrotheory.

That such a valid aggregation is sometimes feasible may be seen in the case of deriving a consumption function for a group of people from their individual consumption functions. If, for all incomes, the marginal propensity to consume of each member of the group is the same as that of all other members, the derivation of the macroconsumption function is a trivail operation. That economic theory assumes that aggregation is sometimes feasible may be seen in the fact that even so-called microeconomics uses such undoubted aggregations as the firm, the household, and the economy (in international trade). Finally, that economic policy takes aggregation for granted may be seen in the use of such really large aggregates as net capital formation, business savings, and the demand for consumers' goods.

Certainly, then, in many places the aggregation problem is assumed to be solved or soluble. Professor Theil and others, however, do not share this complacency, and want to know in what sense it is solved or soluble. In particular, they feel that an explicit consideration of aggregation is necessary or, at least, useful in order successfully to build econometric models of the whole economy or parts of it. (One may argue that aggregation theory is not a *sine qua non* by noting the historical possibility that a macrotheory is invented leading to an econometric model which is very successful in prediction. A long time may elapse before a new microtheory compatible with the macrotheory is invented, and the rules of aggregation connecting the two may be discovered even later. But to be set against this view is the work done by the Economics Research Project at Princeton under Professor Morgenstern. This might be described as "self-conscious aggregation" in which a large Leontief matrix is aggregated in many different ways to a smaller one, and the inverse elements are compared in order to discover what effect aggregation actually has in practice.)

Professor Theil's main approach is to take a stochastic micromodel, and convert it into a macromodel by summing the microvariables and parameters. This leads him to the analysis of the conditions which ensure, for example, that the aggregation procedure does not bias the statistical method used to estimate parameters, or that the disturbances of the macrosystem are at a minimum, or that any macrovariable is affected by the behaviour only of those microvariables from which it is derived. He has many results of this kind, but they do not seem to be very helpful to the econometrist in that for realistic cases his rule of perfection, that the predictions of a macroequation should never contradict the predictions of the microequations corresponding to it, rarely holds. Moreover, the pure theorist too may be hard put to attach a meaning to some of the macrovariables to which Professor Theil's fixed weights aggregations lead him. Of course, neither of these two factors need be decisive. Economic data are often sufficiently inaccurate to prevent the discovery of a significant distinction between macro- and micro-prediction even though the relevant aggregation would be imperfect for more accurate data. In addition, economists, if pressed, have imagination enough to invent a meaning for any variable.

This point, indeed, leads to one last query, whether Professor Theil's line of attack is not a trifle mechanical. By this is meant that he concentrates excessively on making rules, and insufficiently on constructing economic theory. Consider, for example, the problem of obtaining a macroconsumption function from the consumption functions of individual households (consumption being treated simply as a function of disposable income). This is not an easy matter because of varying income distribution ; therefore, one way of solving the aggregation problem would be to invent a macrotheory of income distribution. Thus, the macroequation would include the sums of microvariables and parameters, and other variables which account for income distribution and can be macro-concepts in their own right. Possibly, this is aiming at the moon, but *a priori* it appears to be as potentially fruitful an approach as its alternatives.

In fine, this is a stimulating book in a new field, and few economists will disagree with Professor Theil's conclusion :—

" . . . . . theoretical analysis, empirical findings—especially microresearch—and some intuition are, side by side, necessary for successful macroanalysis.

Sometimes our knowledge and data will not be adequate to do much more than the old ' analogy ' approach of aggregation is able to perform ; sometimes we shall be in a better position. The basis of this work cannot be entirely objective. The degree of subjectivity may be lowered in the course of time, but the present situation is only natural for a science which is not older than some tens of years ".

M. H. PESTON.

Economic Progress: Papers and Proceedings of a Round Table held by the International Economic Association; edited by L. H. DUPRIEZ, assisted by D. C. HAGUE. Louvain. 1955. 574 pp.

Like most other recent works on economic development, this book runs to great length, but it is not as formidable as it appears. In the first place, much of the material is printed both in French and in English, so the book is really only about two-thirds as long as it seems. And secondly, it consists of nineteen essays by different writers, so that those of us whose powers of concentration are limited can take it in several gulps, by reading a few self-contained pages at a time.

Beyond this, its virtues are rather limited, since less than half of the essays are interesting—or interesting to this reviewer. This may be because I failed to understand so many of them. There is a good deal of philosophising about the nature of welfare, the nature of man, and the nature of social science which passed over my head, but which others may find illuminating.

Several of my favourite authors are included. I would award the prize to Professor Habbukuk, whose historical essay on the basic conditions of economic progress in Europe is a masterly and suggestive summary of the essentials of the subject. Also at least a consolation prize to Professor Rostow for his attempt to isolate and classify the sectors of an economy which lead in economic growth—especially as his attempt does not quite come off. Honourable mention to Professor Cairncross, who launches a most elegant attack upon a windmill labelled " Capital Accumulation is the Sole Cause of Economic Growth ". I hope he will not put away his sword, for on the opposite hill a few people are building a castle labelled " Lack of Capital is not an Obstacle to Economic Growth ", and he is just the right man to lead the assault on this position, too.

Not the least entertaining and instructive part of the volume is the summary of what was said when these papers were discussed by sixty economists from twenty-two countries at an International Economic Association conference in 1953. Every shade of opinion was represented, from those who think that every country gets as much economic growth as it deserves, to those who think that a country which does not give itself growth deserves what it gets.

It is hardly to be expected that papers commissioned for such an occasion should blaze new trails. Nevertheless, the Association is right to publish them in full, with discussion. I have no hesitation in recommending the book for browsing here and there.

W. ARTHUR LEWIS.

The Economics of Repressed Inflation. By H. K. CHARLESWORTH. Allen & Unwin. 1956. 126 pp. 13s. 6d.

Two general chapters on the nature and origin of repressed inflation start this book, and a chapter which briefly surveys British experience 1950–54 ends it. In between, Dr. Charlesworth considers the various inefficiencies which result from repressed inflation and the possibility of bringing it to an end by fiscal means.

The analysis is a mixture of common sense and theory; there is no examination of the working of particular controls in any detail, although illustrative examples are occasionally given. It is argued that repressed inflation will not permit of efficient factor allocation, that the restricted availability of many goods will reduce the supply of effort and make labour less mobile in response to monetary incentives, that rationing causes a loss of consumer satisfaction, and that black markets will develop. These and similar points made by the author are all recognised as part of the price that must be paid for a period when heavy capital formation and egalitarianism are the two main aims of economic policy.

Unfortunately, the conclusions, though generally correct, rest upon imprecise theoretical analysis which is annoying to economists and misleading to students. There are quite a number of errors, of which some examples may be given: (1) The Offer curves in the first four diagrams are called Supply curves; (2) " In addition to their effect on consumer satisfaction, controls act to destroy consumer surplus " (p. 55); (3) " An extensive uncontrolled market provides the possibilities of easier and greater substitutability between goods and thereby reduces the convexity of the indifference map " (p. 67); (4) It is not recognised that the imposition of rationing may *raise* the elasticity of demand for unrationed goods; (5) It is implied (p. 65) that " an increase in fixed costs per unit because optimum production is many times unobtainable " will shift the marginal cost curve to the left. Furthermore, woolly exposition sometimes makes it impossible to tell exactly what the author means; an example is afforded by the analysis leading to the conclusion that " repressed inflation leads to lower production at higher cost ". Here it is not clear what the standard of reference is, for under repressed inflation the composition of output and hence relative factor scarcities will be different from those in a free economy, so that not only actual factor combinations but also optimum factor combinations will be different. Yet the author seems to ignore the latter difference.

None of these errors and ambiguities is particularly important taken singly, but in the aggregate they are too many to be ignored. Similarly, the sections of the book dealing with macro-economic problems suffer from imprecise analysis. Dr. Charlesworth hovers uneasily between an Investment-Saving approach and a Factor and Goods market approach; an understanding of Bent Hansen's work on inflation (which he nowhere refers to) would have helped a great deal. Again, he seems to imply (p. 82) that the decision as to the size of budget surplus necessary to remove inflation is independent of the fiscal changes involved, though the following pages show that this is not the case. Yet, as in the earlier chapters, much of what he has to say is simple and sensible, and he considers the important problems.

The book started as a Wisconsin doctor's thesis, partly written while the author was a graduate student in this country. Its present admirable brevity presumably indicates that it has been much revised since, but it will be apparent from what has been said above that a good deal of tidying-up is still needed.

RALPH TURVEY.

Short-term Economic Forecasting: National Bureau of Economic Research. Conference on Research in Income and Wealth. Studies in Income and Wealth. Vol. 17. Geoffrey Cumberlege for Princeton University Press. 1955. 506 pp. 60s.

This volume contains seven papers read at the 1951 Conference on Research in Income and Wealth, with a record of discussion. Those seriously interested in forecasting will wish to read the collection. Compendious publication of conference proceedings, however, has disadvantages : four years would be long to wait for 500 pages of truth ; and the papers (of unequal merit) would be easier to read if shorter.

The first paper, by V. Lewis Bassie, falls somewhat below its aim of providing a general statement. A prosperous economy can evidently bear upon its back a multitude of fortune-tellers, for whose various methods words are here spared. Bassie's criticism of the extreme econometric ambition is just : " most variables are only partly determined by what has gone before . . . It is necessary therefore to make forward estimates of at least some of the variables by other methods." The alternative proposed is " a kind of flexible statistical analysis carried through in terms of the gross national product and national income data ". Under so imprecise a description, truth may well lie hid.

The two most valuable papers deal with investment intentions surveys. Irwin Friend and Jean Bronfenbrenner conduct a post-mortem (up to 1951) on the surveys in the United States. O. J. Firestone describes the considerably more ambitious Canadian surveys, and gives a good idea of their uses and limitations. Stated intentions to invest are not predominantly based on commitments ; and when events belie the forecast, it is better to think of this as a change of plan than as an error of forecast. In aggregate, the surveys predicted the change in trend in 1949 ; but events like the Korean War have effects which are not foreseen. Since the intentions and achievements of *individual firms* show wide dispersion, it is not really clear why aggregate figures give fairly good results. Intentions to invest can be inhibited by shortages—or inflated by consequent price rises. Investment intentions data may therefore be little use without information about likely supplies.

Two further papers deal with general business expectations. If business men had perfect foresight, there would be no interest in macroeconomic forecasts. The record shows that they have not. Franco Modigliani and Owen H. Sauerlender deal with the " shippers' forecasts ", started in 1927 ; and the postwar surveys of business opinion collected by *Fortune* and by Dun and Bradstreet. Only the *Fortune* Surveys, from a self-selected sample of " top executives ", betray some intelligent foresight. The reason in other cases may be a common inability to answer questions inviting comparison with a year ago. At the end of their paper the authors try to use data on expectations to help to explain changes in production and stocks in a few industries. A separate paper by Thor Hultgren further dissects the " Shippers " errors. One wonders that the fourteen regional Shippers' Advisory Boards have had the heart to continue so long to meet each quarter and misstate their transportation requirements so badly.

Two final papers, by John B. Lansing and Stephen B. Withey, and by Irving Schweiger, deal with surveys of consumers' intentions. The first is an exhaustive analysis of the internal relations of the data. Thus, 28 tables, for a very small sample, show that only half who bought cars said they would :

only half who said they would, did ; and only half who didn't remembered they said they would. In spite of the claims made, it is difficult to believe that information about intentions alone is much use for forecasting ; and it is surprising that the authors made no attempt to use it along with price and income forecasts.

J. C. R. Dow

Economics : a General Introduction. By Frederic Benham. Fifth edition. Sir Isaac Pitman & Sons, Ltd. 1955. v + 568 pp. 18s.

Economics : an Introductory Analysis. By Paul A. Samuelson. Third Edition. Mc Graw-Hill Publishing Co. Ltd. 1955. xx + 905 pp. 35s.

Economic Analysis. By Kenneth E. Boulding. Third edition. Hamish Hamilton, Ltd. 1955. 35s.

The review of the fourth edition of Benham's *Economics* in this Journal (August, 1949) commended it for the non-specialist reader, as providing " a combination of elementary economic theory with its immediate application ". For the student wishing to proceed to specialisation, and requiring " a convenient point of departure for the more distant ports of call in the land of macro-economics ", the book was considered less satisfactory. The unchanging " fundamental platitudes of economics " to which Benham referred had come to require explanation in rather different terms and with a rather different emphasis. The criticism has gained in weight since it was written; the theory of employment is now an integral part of any general course in economics, however non-specialist, elementary or cursory. This is recognised in the new edition, which sets out primarily to remedy the shortcomings of the book in the treatment of macro-economics and allied questions. The consequence is the most drastic revision that the work has yet undergone; the book is much altered in content and order of treatment. Nevertheless, it retains the general approach and the satisfactory balance of analysis and description that were characteristic of earlier editions. There is a new chapter on national income, a fuller discussion of saving-investment relationships, and a more extensive and contemporary discussion of public policy in general and of the maintenance of full employment in particular. The examples have been brought up to date and are generally well chosen (though the computation of average avoidable unemployment as 4 per cent. of working population over the period 1920–39 (pp. 22-23) is perhaps misleading). The introduction, which was always excellent, has been re-written; it must be one of the most valuable general surveys in any book of this kind.

Professor Benham's book has worn well. The new edition continues the conscientious attitude of earlier ones; there are not many introductions to economics that beg so few questions and evade so few issues. Benham's *Economics* is still an excellent first text for any serious student who wants neither a " cram " book nor a superficial one.

The new editions of the books of Professors Samuelson and Boulding have a rather different purpose in mind. In both cases they appear to have been stimulated by a determined attempt to " keep abreast "; there is some evidence for the view that the American attitude to " last year's model " is not without influence in the text-book market. The nature of the market does of course encourage this; the books are designed to provide complete " one- or two-semester courses " for non-specialist students, and the student expects to find all he needs between their covers. The shift in emphasis in successive editions is thus a matter of some interest, as is the similarity in the nature of the changes made in these present new editions.

Professor Samuelson states the position succinctly: his first edition emphasised depression (the attitude and interest of the 40's), the second edition emphasised inflation (the problem of the 50's), and the present revision reflects the growing interest in questions of efficient growth and economic security. There is some good new material on underdeveloped territories, a more extensive treatment of monetary policy, and an improvement in the treatment of price analysis. In so far as any comprehensive text book can possess such a quality, Samuelson's book has a compulsive readability. Diagrams and similar technical apparatus are kept to the essential minimum, and the skill in exposition is no more extraordinary than the lightness of touch with which the argument is developed.

Professor Boulding's approach is somewhat less ebullient, and gives more attention and importance to the explanation and use of the formal diagrammatic and other apparatus of the subject; he is less concerned with description or with current matters, a little less " up to the minute ": nevertheless, the changes from the last edition of *Economic Analysis* show a similar trend to those just described. There is an expansion of the section on macroeconomic analysis, and more attention is now paid to problems of dynamics and growth. The book is less easy to read than Samuelson, but may give the student who can work through it a more thorough grasp of the techniques of economic analysis, particularly if he can cope with the " more advanced analysis " of Part IV. It is a pity, however, that Professor Boulding did not take the opportunity to squash the flea that he uses in this section to illustrate returns to scale. These physiological monstrosities confuse the better students and mislead the rest.

Both books rely primarily on American illustrations and experience, a fact that must place them at some disadvantage here as the number of British alternatives grows.

J. WISEMAN.

World Commerce and Governments: Trends and Outlook. By W S. and E. S. WOYTINSKY. The Twentieth Century Fund, New York. 1955. lii + 907 pp. $10.

This is the second and final volume embodying the results of Mr. and Mrs. Woytinsky's investigation of modern civilisation; the first (*World Population and Production*) dealt with the resources available to the economic machine and the output produced by it, and this is now supplemented by a study of international economic relationships, transport, and political institutions.

The book opens with an enquiry into the history and present state of international trade; numerous data on the development of world trade over the last fifty years, as well as on its direction and commodity composition, are presented, and much detailed information is also provided on the overseas trade of the more important individual countries. An investigation into international payments and capital movements, and a chapter on commercial policy, conclude the first part of the book.

The second part is devoted to transport. After a general survey attempting to establish the place of this industry in the world economy, the main forms of transportation are successively reviewed. This section includes a good deal of interesting historical information and a welter of statistics on all kinds of matter related to the topic.

This takes the reader to Part 3, which is headed " Governments "; here we find a discussion of various aspects of central governments, including state finances, information on elections and political parties, a section dealing with colonies, and a final chapter on international co-operation. Again we are presented with a large amount of statistical material.

In the words of the introduction, the aim of the two volumes is to " describe, measure, and explain the progress of mechanised civilization "—truly a most courageous endeavour which, however, can hardly be said to have met with success. In the first place, one might query a treatment of mechanised civilisation which is limited to the economic and political aspects. Rather more important, the work is almost entirely confined to description and measurement, and little attention is paid to the third objective, that of explanation. There is no coherent argument and no attempt at arriving at some overall conclusion or summary; and over large parts of the study the text is little more than a commentary on the statistics provided and fails to furnish any very logical link between the tables.

In reality, therefore, the value of the work lies mainly in the fact that it is a source of statistical information on the subjects covered—though indeed a rich one—and one must be grateful to the authors for generally providing detailed references about their own sources and methods of calculation. The data themselves are not always accurate, but perhaps that could not be expected in view of the scope of the study ; rather more important, the user must be prepared to check on the international comparability of the figures, which can by no means be taken for granted.

Judged solely as a work of reference for statistical material and sources, Mr. and Mrs. Woytinsky's study should prove valuable to those interested in empirical investigation; and although this is perhaps but a modest attainment in view of the purpose of the undertaking, one cannot leave it without being impressed by the courage and industry of the authors.

H. H. LIESNER.

The Rebecca Riots : a Study in Agrarian Discontent. By DAVID WILLIAMS. University of Wales Press. 1955. x + 377 pp. 25s.

Industrialisation and its social effects have already been the subject of a number of regional histories; here, to bring out the contrast, is a penetrating, lively, and well documented study of what happened before 1850 in a part of Britain which escaped industrialisation. The erection of additional toll gates was merely the occasion of the outbreak of rioting in West Wales in 1839 and 1842–3; the real causes lay in the economic and social background to which Professor Williams devotes the whole of the first half of his book. Between 1750 and 1850 the population probably doubled in size without any appreciable increase in the resources at its command. (The section on population growth adds a noteworthy contribution to the present controversy.) Agricultural prices remained low after their post-war fall, but landlords continued to shorten the length of leases and to screw up rents. Living conditions were generally bad and sanitation often non-existent. Lawlessness was rife, and there was a tradition of intimidation and open violence. Nocturnal *ceffyl pren* processions—certain precursors of Rebeccaism—grew more popular. The spread of Nonconformity heightened religious grievances, and widespread opposition to the new Poor Law added to the unrest. Determined action was required from the local magistracy. But those of the " arrogant, extravagant and shiftless " gentry who were not absentees " spent their useless lives in the preservation of game and its wholesale slaughter ". The discontented population had no respect for them and despised the " justices' justice " which they meted out. After a chapter on the turnpikes of the region, which should be of interest to transport historians, the two outbreaks of rioting are described in detail. A number of amusing anecdotes make this volume entertaining as well as instructive.

T. C. Barker.

Bank of Canada Operations 1935-1954. By E. P. Neufeld. Toronto University Press; London, Cumberlege. 1955. 221 pp. 30s.

One would scarcely need to be told that this book, with its 450 footnotes and 37 pages of appendices to only 145 pages of text, was based on a Ph.D. thesis. After reading it, one would also guess, and rightly, that it was a successful, indeed a prizewinning, thesis. The writing is appropriately austere, with little light relief, but the subject is important and its study highly rewarding. Most countries can now boast the existence of a central bank, but few of these have a long history. Accounts of their doings are even fewer, so that we have little detailed knowledge of how central banks operate, especially in the " new " countries. True, the story could with patience be pieced together from a thousand different sources, but Dr. Neufeld has done this for us in one important instance, and, since most countries hope or intend, by planning, to emulate Canada's rate of economic growth, the account of Canadian central banking is of wide interest.

The story tells " how a central bank, without tradition and prestige, and operating in a semi-developed financial community, was able to become an indispensable adjunct to an already well-developed banking system ". It is, in fact, the history of conscious monetary control in Canada. The author, himself a Canadian, begins with a chapter on the relationship between the Bank and the Dominion Government, and two chapters on the Bank's ends and means. These are not startlingly new. Rather does interest focus on the flexible use of techniques, both orthodox and unorthodox elsewhere, in an advancing economy without, until very recently, a money market. Dr. Neufeld then describes the Bank's operations in three well defined and completely different periods—the pre-war years of unemployment, when the Bank was new and uncertain of itself, its powers and its influence; the war, when its major task, as in most other countries, was that of ensuring cheap war-finance; and the post-war years, when the problem has been essentially one of quick reactions, in periods of alternating hectic boom and recession, of huge capital inflows followed by sudden cessations, of balance of payments deficits and then surpluses of embarrassing dimensions.

The only criticism of a very clear account is that the uninitiated gain little idea of the structure and ordinary banking operations of the chartered banks, and it is these banks after all, on which the Bank of Canada is operating. But reviewers are ever greedy—and we must applaud the authoritative closing of an important gap in the literature.

R. G. Opie.

Mainsprings of the German Revival. By H. C. WALLICH. Yale University Press; London, Cumberlege. 1955. xi + 401 pp. 36s. net.

It is both easy and tempting to single out one particular feature of Germany's post-war history as *the* cause of her amazing economic recovery. Many have been singled out by various writers—hard work, labour discipline, the currency reform, the taxation system, Marshall Aid, tight and dear money, a free market economy, and so on. The author, together with most Germans, rejects the whole idea of " an economic miracle ", and argues, surely rightly, that the miracle consisted instead in the happy coincidence of all these factors in one place at one time.

Professor Wallich's book is the first thorough and objective analysis of this success story to appear in English. He begins with a short survey of events, followed by a general theory of economic development, since he views " the German achievement not only as a recovery but also as a process of growth ". Then follows a series of chapters on the policies pursued by both Allied and German authorities, ending with a short appraisal of the parts played in the whole process by German politics and the German mentality. In each chapter on policy, Professor Wallich is at pains to emphasise the effect of factors quite outside that particular field. After this book, it will no longer be possible for partisans, either political or economic, to single out any one act of policy. The whole impression left by the book is that of " the remarkable combination of good luck and good management ". It will be interesting to see which, if either, of these persist into the era of brimful employment now begun in Western Germany.

R. G. OPIE.

Problem Families: the fourth report of the Southampton Survey. By P. FORD. C. J. THOMAS and E. T. ASHTON. Blackwell. 1955. xi + 51 pp. 4s.

Most of our knowledge of problem families derives from the work of doctors and social workers. Sociologists are beginning to show interest in the question. This report on problem families is the result of an investigation made by three members of the Department of Economics of Southampton University. At the invitation of the Social Rehabilitation Committee of Southampton they examine and make a statistical analysis of 104 problem families.

Given that a main difficulty in the study of problem families is that they can be recognised but not defined, the authors make clear that they are dealing with problem families in the " administrator's sense " and that their study has a practical aim. The method is to analyse the families according to certain criteria—marital condition, size and composition of family, economic dependence, etc.—and from this to identify the characteristics which may seem to belong to the problem family. Then the analysis is carried further to show the incidence of these " problem family " characteristics in each family and in the group as a whole.

The statistics confirm the widely accepted view: that a family becomes a problem family through a varied combination of characteristics and that problem families are by no means homogeneous. The findings underline the policy which is increasingly pursued: that the approach must be individual and differentiated and directed to the particular weaknesses of each family.

In clarifying the task of those concerned with the rehabilitation of problem families, the Report fulfils its practical purpose. But at the end we return to the authors' reservations about the limits of the statistical investigation of the problem family.

CHRISTINE COCKBURN.

SHORTER NOTICES

Der Konsumentenkredit. By FRIEDRICH A. LUTZ. Carl Heymanns Verlag, Cologne and Berlin. 1954. 123 pp.

Professor Lutz's booklet on consumers' credit divides itself into three parts; the first outlines the forms and extent of consumers' credit in the United States and Germany, the second discusses some of its theoretical implications, whilst the third evaluates its significance from the angle of economic and social policy.

The emphasis of the study is placed on the theoretical part. Here the author's main concern is to investigate the effects of consumers' credit upon the levels of consumption and investment under conditions of full employment; whilst the analysis is not always rigorous, his conclusion—that consumption will be stimulated at the expense of investment—is probably valid. There is also a brief discussion of the importance of consumers' credit for the business cycle.

Although Professor Lutz by no means exhausts his subject, this is a useful publication, and it is to be regretted that the language barrier will prevent its reaching a wider public in English-speaking countries.

A Survey of International Trade Theory. By GOTTFRIED HABERLER. International Finance Section, Princeton University. 1955. 68 pp.

This enlarged version of an article written for the *Handwörterbuch der Sozialwissenschaften* provides an admirable summary of the basic features of current international trade theory. The main emphasis is obviously reserved for the two principal parts of modern doctrine—the pure theory of international trade, both in its classical and modern versions, and the theory of the balance of payments adjustment mechanism; but there is also a welcome discussion of various concepts of the terms of trade, and a brief concluding chapter on trade policy. A detailed and up-to-date bibliography completes this exceedingly useful publication.

Liberalisation of Europe's Dollar Trade. Organisation for European Economic Co-operation, Paris. 1956. 135 pp.

The recent past has seen substantial advances made in the liberalisation of trade not only amongst the Western European countries themselves, but also as regards their imports from the Dollar Area. This is the conclusion drawn by the first part of the above O.E.E.C. report, which investigates in turn the progress of each member country, and also discusses the effects of freer dollar imports upon alternative sources of supply and Europe's balance of payments. The second part of this study turns to the prospects for further advance. It deals with measures taken by the United States and Canada which should help Europe to increase her dollar earnings, and investigates some of the factors hindering an extension of liberalisation; the conclusion points to the many advantages to be derived from freer dollar trade.

Nationalekonomisk teori—en inledande översikt. By HARALD DICKSON. Svenska bokförlaget Norstedts, Stockholm. 1955. xii + 305 pp. Kr. 26.

This dry, systematic book is intended as an introduction to economic theory for undergraduates—presumably those whose principal studies are in this field, for it makes no concessions to the weaker brethren, in content or in presentation. The exposition proceeds in a strictly logical manner, starting from a highly simplified model without money, foreign trade, or official activity, with one consumer's good, a fixed supply of factors, and only one (perfectly competitive) market—that for labour (also homogeneous). These restrictive assumptions are raised one by one so that the analysis gradually becomes more general. Only simple mathematical techniques are used, but this book will nevertheless be tough going for the beginner.

The European Housing Situation. United Nations. Reports of the Economic Commission for Europe. Geneva. 1956. 56 pp. 3s. 6d.

This study presents a purely factual analysis of the housing situation in twenty-three individual European countries and in Europe as a whole. The analysis is very carefully prepared. The reader is warned to take great care in making inter-country comparisons, and this warning is backed by a full discussion of the methodology of the statistical analysis. There is also a useful appendix of sources.

Oxford Regional Economic Atlas of the U.S.S.R. and Eastern Europe. Prepared by the Economist Intelligence Unit and the Cartographic Department of the Clarendon Press, Oxford. Oxford University Press. 1956. viii + 134 pp. 42s.

With *The U.S.S.R. and Eastern Europe* the series of eight regional atlases, designed to supplement and amplify the now well known *Oxford Economic Atlas of the World*, makes an excellent start. It has been produced with care and vision; the distribution maps of crops and livestock, minerals, industries and population that form the principal section of the atlas are well designed, clearly printed and based on a critical interpretation of the most recently available material. It is, in fact, much more than an atlas, for the concise textual summaries which accompany each set of maps give the basic material for an appreciation of the economic geography of the areas concerned. There is a very full index. This atlas will be of value to students of economic conditions in the areas concerned, as well as to those more specially interested in the cartographic representation of economic patterns. Further volumes in the series will be keenly awaited.

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Seven Centuries of the Prices of Consumables, compared with Builders' Wage-rates

By E. H. PHELPS BROWN and SHEILA V. HOPKINS[1]

In an earlier paper[2] we gave an account of builders' wages in southern England from 1264 to 1954, and now we shall try to relate these to the prices of some of the main articles of consumption. In 1901 Steffen[3] displayed the movements of two wage-rates in comparison with those of the prices of wheat and meat through the preceding six centuries and more: it was his Tafel II that first displayed the striking evidence for a great rise and fall in the real income of the wage-earner between 1300 and 1600, the level reached in 1450–1500 apparently not being regained until after 1860. We shall test these indications by bringing a wider range of prices to bear.

I

Nowadays, real wages are commonly estimated by comparing money earnings with an index of the cost of living, but there are several reasons why we cannot do that here. On the side of income, all we have is the rate of pay for a day, and we do not know how many days' work the builder was getting in the year from time to time, nor what other resources he had. On the side of outlay, we know little or nothing about some important costs, notably rent, and the prices we do have are more wholesale than retail. These things apart, we still could not attach much meaning to " the cost of maintaining a constant standard of living " through seven centuries of social change.

So we have not tried to construct any measure of real wages in the modern sense. Yet when we find the craftsmen who have been building Nuffield College in Oxford in our own day earning a hundred and fifty pennies in the time it took their forbears building Merton to earn one, the impulse to break through the veil of money becomes powerful: we are bound to ask, what sort of command over the things builders buy did these pennies give from time to time? It is this question we try to answer here.

Our answer takes the form of an aggregate price year by year for a composite commodity, made up always of the same amounts of some of the main heads of consumption : we can think of it as a package always containing the same sized bagfuls of bread-stuffs, meat, cloth, and so on. The contents of each bag have been made up variously from time to time: in our bread-stuffs, for instance, we give a greater place to wheat, and correspondingly less to rye and barley, as the eighteenth century wears on. But we have kept the bags themselves of the same size throughout, so that the package they make up should provide what is in the main a common composite physical unit, in which to express the purchasing powers of sums of money at different dates throughout our long period. Whenever the costs of the bagfuls move differently from one another, the changes in the cost of our composite unit will indicate those of the wage-earner's cost of living only to the extent that the make-up of our unit resembles that of his actual basketful. But this will certainly have varied from time to time, particularly when his purchasing power changed as much as this inquiry proves to suggest it did; and the evidence by which we chose the make-up of our unit is in any case fragmentary.

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[1] We owe to Mr. S. Ahmed, Dr. Gethyn Davies and Mr. J. Veverka much valued help in computing, and are further indebted to our colleagues Professors Carus-Wilson and Fisher and Dr. A. H. John for commenting on our work in galley.

[2] " Seven Centuries of Building Wages ", *Economica*, XXII, 87 (August 1955).

[3] G. F. Steffen, *Studien zur Geschichte der englischen Lohnarbeiter*, vol. I (Stuttgart, 1901), esp. Tafel I and II, at p. 112. Most of the materials of these two graphs are reproduced in Appx. I of H. O. Meredith, *Economic History of England*, 5th ed. 1949.

This evidence is set out in Table 1. William Savernak's account book[1] records seven years of the weekly expenditure of a small household—two priests and a servant—at Bridport in Dorset, in the 1450's:

TABLE 1

DISTRIBUTION OF OUTLAY BETWEEN CERTAIN HEADS OF HOUSEHOLD EXPENDITURE

	W. Savernak 1453–60	Davies & Eden 1790's	Board of Trade 1904–13	Weights taken here
	%	%	%	%
1. Farinaceous	20	53	16	20
2. Meat, fish	35	12	21½	25
3. Butter, cheese.. ..	2	7	16	12½
4. Drink (malt, hops, sugar, tea)	23	9	24	22½
Subtotal, Food	80	81	77½	80
5. Fuel and light ..	7½	7½	9	7½
6. Textiles	n.a.	11½	13½	12½
Total	87½	100	100	100

within our scope here fall the entries for thirteen articles of food, and for candles and fuel, to the amount of some forty pence a week, or getting on for seven days' pay of a building craftsman at that time. But there is no sufficient record of outlay on clothes, and in showing the distribution of the outlay included in Table 1 over its first five heads, we have allowed them only the 87½ percentage points in all that they get in the last column. The second column summarises the accounts of nearly sixty households in the villages or small towns of southern England, that two students of poverty recorded in the 1790's.[1] The third column rests on the estimate made, when the old Cost of Living Index was set up during the First World War, of the distribution of " average pre-war working-class expenditure ", and so its detail for food derives mainly from the " 1,944 urban working-class budgets collected by the Board of Trade in 1904 ",[2] but we have raised the weight of the fourth head and of food as a whole by adding outlay on beer, which we took to be a slightly greater part of all outlay in 1904–13 than in 1938.[3]

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[1] K. L. Wood-Legh, *A Small Household of the Fifteenth Century* (Manchester University Press, 1956).

The most striking feature of the Table is the similarity between Savernak's budget and that of the wage-earners four-and-a-half centuries later: Savernak, it is true, spent much more on meat and fish and less on butter and cheese, but the combined weight of these two heads is almost the same in both columns. Davies and Eden portray poor people in hard times, and it is not surprising that they show so great a part of the outlay on food as spent on bread-stuffs: what again is striking is that the distribution of the recorded outlay over food and the two remaining heads should differ so little from the budgets of 1904-13. So it seemed not unreasonable at the outset to adopt the figures of the last column as weights with which to combine the price-indexes of the six heads, all through the centuries: though since this amounts to following the total cost of a package of unchanged physical make-up, it does imply changes from time to time in the proportionate distribution of *outlay*, to the extent that those price-indexes diverged from one another.

But the components under each of those six heads change their own subweights not a little from time to time. Sometimes we made these changes deliberately, to take account of shifting habits of consumption, or the entry of new products; more often our hand was forced by lack of materials. In general, we arranged the subweighting of such series as we selected or were all we had from time to time, according to the detail in the budgets already cited, and failing that, in the half-light of general knowledge: such were our only grounds, for instance, for giving beef and mutton equal weights, and meat of all kinds about five times the weight of fish.[4]

The upshot is illustrated by Table 2, which takes as the unit of our composite commodity what a hundred pence would buy in 1451–75, and shows the articles that made up this unit about the beginning

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[1] David Davies, Rector of Barkham, Berks., *The Case of Labourers in Husbandry* (1795). Sir Frederic Morton Eden, Bart., *The State of the Poor* (1797).

[2] *The Cost of Living Index Number: Method of Compilation.* Ministry of Labour (June 1934).

[3] Para. 12 of Supplement No. 2 (January 1948) to the *Industrial Relations Handbook* (Ministry of Labour, 1944).

[4] The detail of the subweighting is set out, with a table giving separate indexes for the six heads, in a duplicated paper of which a limited supply is available to applicants.

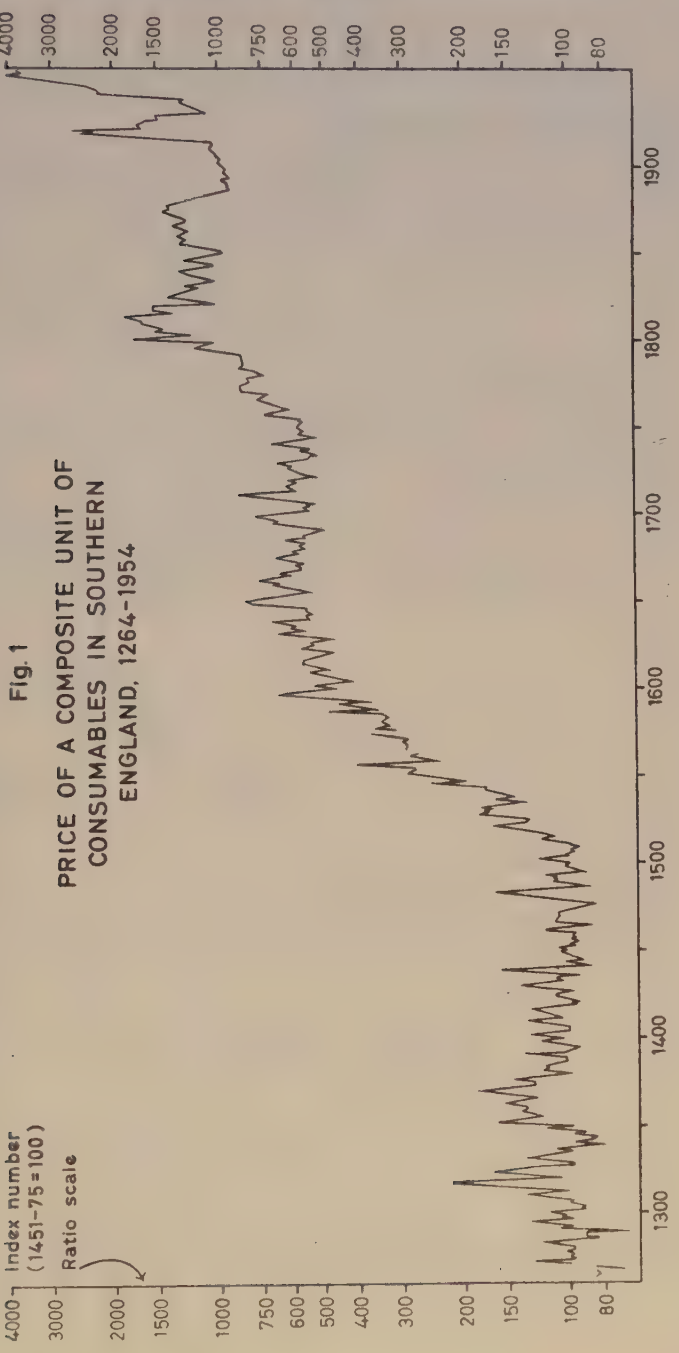


Fig. 1

PRICE OF A COMPOSITE UNIT OF CONSUMABLES IN SOUTHERN ENGLAND, 1264-1954

FIG. 2

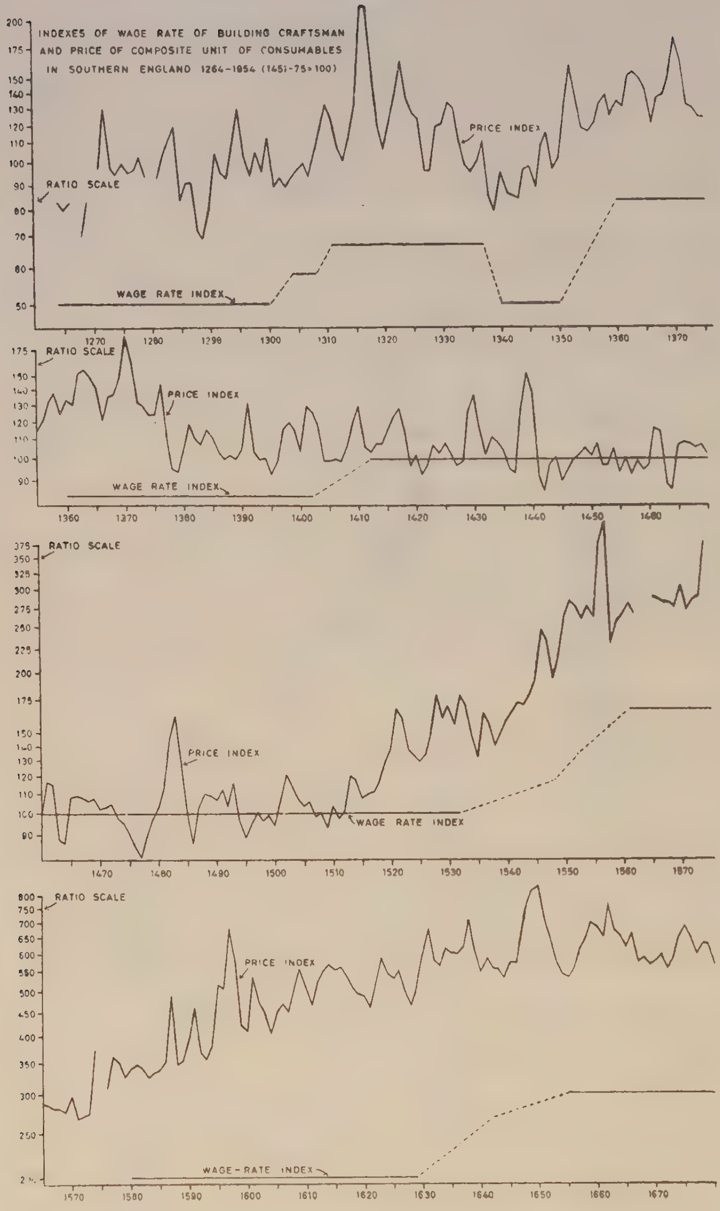
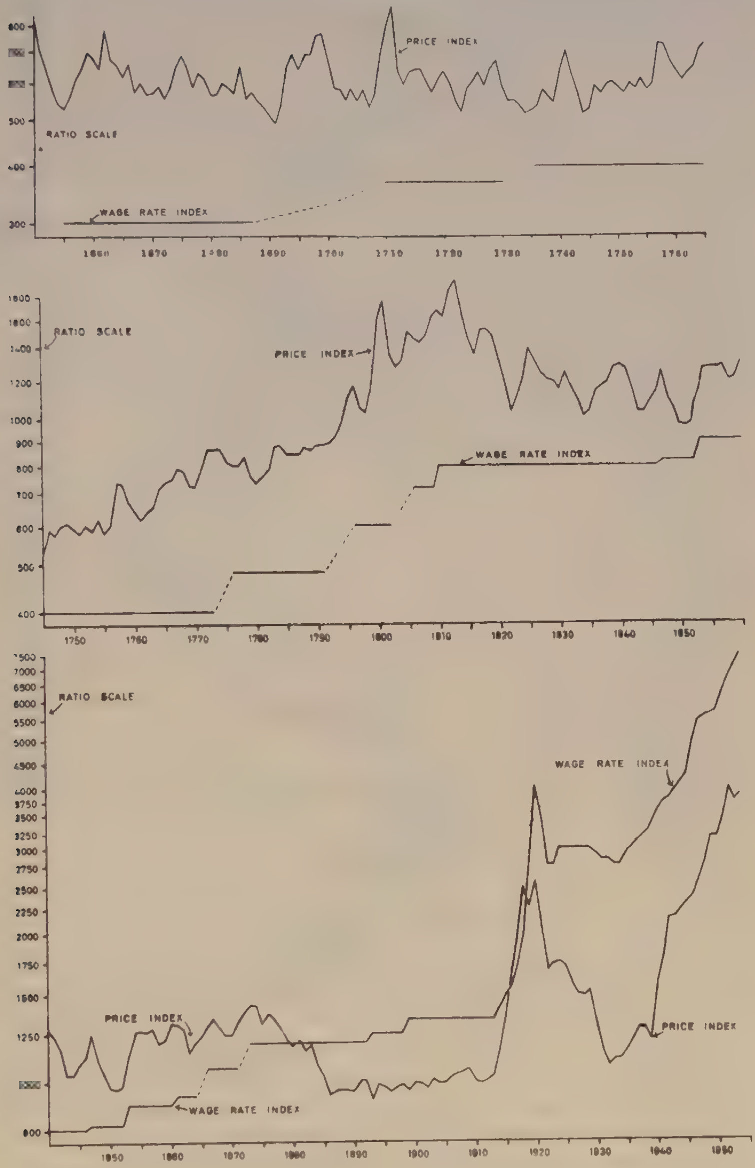

INDEXES OF WAGE RATE OF BUILDING CRAFTSMAN
AND PRICE OF COMPOSITE UNIT OF CONSUMABLES
IN SOUTHERN ENGLAND 1264-1954 (1451-75=100)
RATIO SCALE
PRICE INDEX
WAGE RATE INDEX
200
175
150
140
130
120
110
100
90
80
70
60
50
1270
1280
1290
1300
1310
1320
1330
1340
1350
1360
1370
1380
1390
1400
1410
1420
1430
1440
1450
1460
375
350
325
300
275
250
225
1470
1480
1490
1500
1510
1520
1530
1540
1550
1560
1570
800
750
700
650
600
550
500
450
400
350
250
WAGE-RATE INDEX
1580
1590
1600
1610
1620
1630
1640
1650
1660
1670

FIG 2 CONTINUED



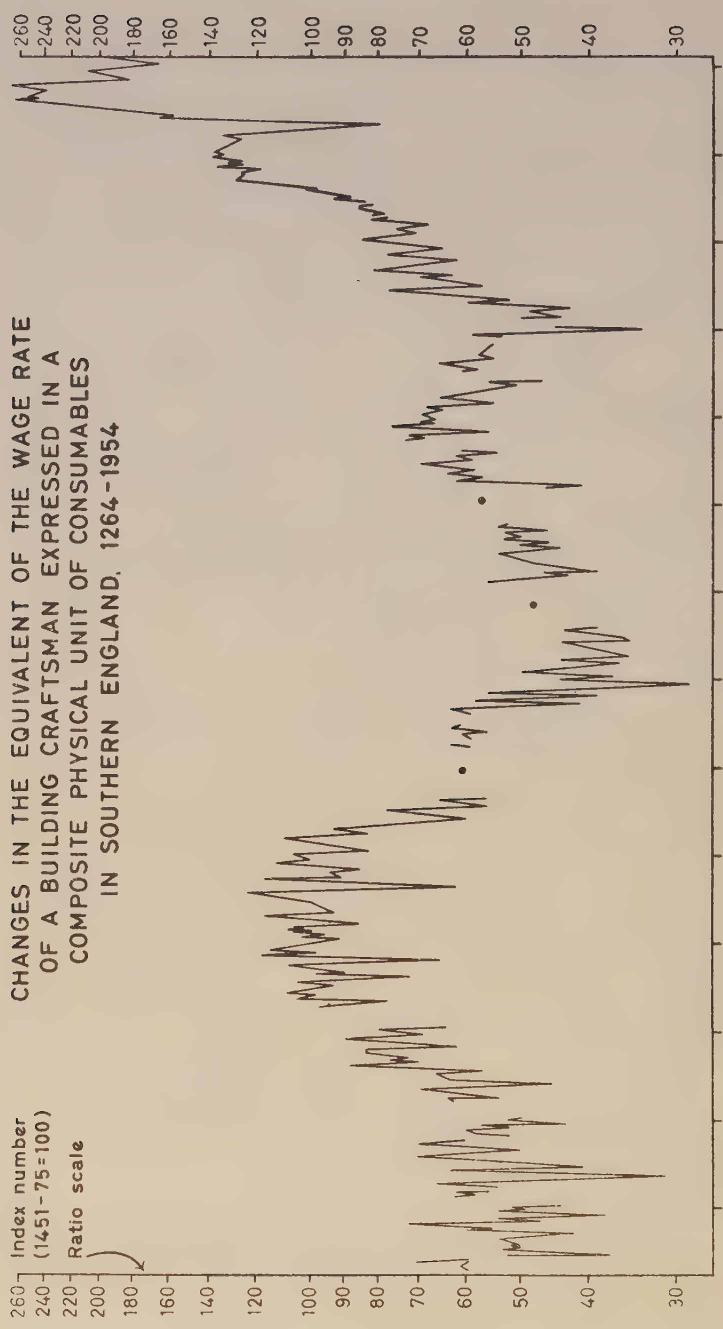


Fig. 3

CHANGES IN THE EQUIVALENT OF THE WAGE RATE OF A BUILDING CRAFTSMAN EXPRESSED IN A COMPOSITE PHYSICAL UNIT OF CONSUMABLES IN SOUTHERN ENGLAND, 1264–1954 and end of our period and at two equidistant points between. There is continuity between one year and another in two ways: the weights of the six heads remain the same; when one article takes over outlay from another under the same head, the place of each pennyworth withdrawn is taken by so much of the new article as a penny would buy at its own price, or the price of its lineal forbear, in the base period. It is in this limited sense that we can regard our changing package as providing a common unit in different years: and even say, for instance, that in the 1930's the craftsman's rate would cover five of these units for every one it covered around 1300. This is far from measuring changes in the standard of living, but it tells us something about them. Yet the very size of the changes it suggests brings out one of its limitations: for it takes the relative quantities of the main heads as constant, whereas in such a fall, for instance, in the purchasing power of the wage as the sixteenth century brought, the proportion of meat to bread must surely have fallen.

TABLE 2

APPROXIMATE QUANTITIES OF ARTICLES MAKING UP THE COMPOSITE UNIT OF CONSUMABLES, AROUND FOUR DATES

	1275	1500	1725	1950
1. Farinaceous ..	1¼ bush. wheat 1 bush. rye ½ bush. barley ⅜ bush. peas	1¼ bush. wheat 1 bush. rye ½ bush. barley ⅜ bush. peas	1½ bush. wheat ¾ bush. rye ⅓ bush. barley ½ bush. peas	2 bush. wheat 1 cwt. potatoes
2. Meat, fish ..	The meat of ½ pig ½ sheep 40 herrings	The meat of 1½ sheep 15 white herrings 25 red herrings	The meat of ½ sheep 33 lb. beef 1¼ salt cod	The meat of ⅜ sheep 28 lb. beef 1½ lb. cod 3 lb. herrings
3. Butter, cheese	10 lb. butter 10 lb. cheese	nil	10 lb. butter 10 lb. cheese	10 lb. butter 10 lb. cheese
4. Drink ..	4½ bush. malt	4½ bush. malt	3¼ bush. malt 3 lb. hops 1½ lb. sugar	2⅓ bush. malt 2¼ lb. hops 5 lb. sugar 4½ lb. tea
5. Fuel, light ..	nil	4¼ bush. charcoal 2¾ lb. candles ½ pt. oil	1½ bush. charcoal 1 cwt. coal 2½ lb. candles ½ pt. oil	2 cwt. coal 5½ pts. paraffin 300 cu. ft. coal gas
6. Textiles ..	3¼ yd. canvas	⅜ yd. canvas ½ yd. shirting ⅓ yd. woollen cloth	½ yd. woollen cloth	¾ lb. wool yarn 3 yds. printer's cotton cloth

II

The sources we have drawn on for our prices are set out in Appendix A. Two of them are outstanding. We are reaping where other men have sown, and for any interest this study may afford, the credit belongs to Thorold Rogers and Beveridge.

Until early in the nineteenth century, most of our prices record what was paid by buyers in a local market or annual fair, or what a local purveyor charged for supplies delivered to the consumer's door. Rogers' prices come mostly from the accounts of the manors of Oxford colleges, and the provisioning of Oxford and Cambridge colleges themselves, with the similar household accounts of some great lay and monastic landlords. Most of the prices we have taken from Beveridge come from the accounts of colleges and hospitals, and from the Navy Victualling service. In sum, these prices give the terms on which raw or partially processed materials were available to consumers who bought locally in some bulk. But after Beveridge's records end, in the early nineteenth century, we have gone on with prices that are wholesale in the modern sense—quotations from the organised produce markets, and average values of imports or exports. We know how these show more and bigger movements than the prices paid for small quantities at retail. It is a further limitation that we have been able to include few fabricated articles. So our prices are not those at which the craftsman's wage was spent with the butcher, the baker, the candlestick maker; they do measure changes in the command of money over some of the main materials of consumption, at points where these are bought in some bulk, and when such changes were substantial and sustained they would come through to the craftsman; but even so, our index is still not responsive enough to changes in the costs of fabrication.

There are other respects in which these materials fall short. For one thing, they make no allowance for changes in quality: how like or unlike were the three quarters of wheat that were sold at Easington near Thame and helped make up our index for 1264, to the Manitoba No. 1 that is the subject of our last quotations? Changes in quantity as well as quality may have crept in, when provisioning went on, as it often did, for a long run of years at an unchanging price; or other adjustments, not recorded in the price, would have been made in the payment from time to time: our only remedy was to avoid all such constant series as far as possible, though sometimes they will have meant what they said. The worst shortcoming is the absence of some annual records altogether: especially for fuel and light in the earliest years, butter and cheese in the fifteenth and sixteenth centuries, and fish in the eighteenth. There are also many gaps, here and there, of a year or two at a time. It has been a matter of judgment, place by place, which of three possible courses to follow: simply accept the gap and carry the index on with the remaining series; transfer the weight of the missing series to some other that is close akin to it; fill the gap by interpolation.

To give our price-series their place in the index for the composite commodity, we had to express each as a relative to its own average in a common base-period. This is 1451–75, chosen because it lies within a long period of stability in the trend of prices—though it turns out to have been a time of exceptional prosperity. But of course many series do not run through it, and these we have had to set in their right relation to those that do. Often this raised no problem: if a new series differed from an old only by giving the price of another grade or region, and the two moved together through a number of years of overlap, then splicing was straightforward. But if either of these conditions was absent, we had to be wary of falsifying the whole later course of the new index by including some abnormality in the splice, or misplacing a turning-point by choosing the wrong place at which to join two series of divergent trends. Again, when the new series was not merely a variant of some old one, but brought a new commodity in—when hops appeared in the sixteenth century, for example, or potatoes in the eighteenth—we had to select the old series that seemed most akin to it, to join it to: so we joined hops to malt, and potatoes to peas. This involved the absurdity, if you will, of saying that potatoes cost four times as much in 1785 as in 1451–75, when there were none: but we can give an intelligible cast to this if we take potatoes and peas as two spokesmen, so to speak, for the one class of vegetables, and think of the one being brought in to supplement or take over from the other, just as when a series for beef becomes available we bring it in to supplement the price of mutton and fill out the index for meat.

III

Our findings are summarised in Appendix B and displayed in the three figures. Many of them will be familiar to the economic historian. It is to his knowledge, and to the more detailed study of our present materials period by period, that we must look for answers to the questions they seem to raise.

The index of prices has two periods each of about 130 years, 1380–1510, and 1630–1760, throughout which there is constancy in the general level, and this surprising stability, as it seems to us, was maintained through fluctuations of two or three years' span, due no doubt mostly to the harvest, whose violence seems no less extraordinary: what was the secret of this stability, and how was it held through such vibration? There are also two periods, about 1270–1380, and 1815–1914, when a trend that is fairly level from end to end is modulated by " secondary secular movements ", as we call them now: what makes the difference between the two sorts of period? The most marked feature of Fig. 1 is the extent, and persistence, of the Tudor inflation: what carried it on so far, and why did it end when it did? For a century and more, it seems, prices will obey one all-powerful law; it changes, and a new law prevails; a war that would have cast the trend up to new heights in one dispensation is powerless to deflect it in another. Do we yet know what are the factors that set this stamp on an age; and why, after they have held on so long through such shakings, at last they give way, quickly and completely, to others?

The simplest impression of the physical equivalent of the wage-rate, that Fig. 3 displays, is of a level much the same throughout, broken through only by a time of much greater prosperity from 1380 to 1510, and a rise that sets in at the last, from 1820 onwards, and carries us up to a new region altogether. We can go on to notice some differences in the level: the depths, for instance, to which it fell at the ends of the sixteenth century and the eighteenth, and the substantial rise from the Civil War to the 1740's. In considering all these things we want to know how far our building craftsman was representative of working men generally, whether wage-earners or not, and it is relevant here that the building labourer's rate did change in the same proportion as the craftsman's with great consistency from the Black Death to the First World War. If the movements of Fig. 3 were indeed not confined to certain crafts but were of some generality, then their size and shape mark deepgoing economic changes. Was it an advance in productivity, deserving the title of revolution, that about doubled the commodity equivalent between the Black Death and Agincourt, and held it at its new level for nearly a century? A drastic fall set in about 1510: the level enjoyed at the accession of Henry VIII was not to be reached again until 1880; the lowest point we record in seven centuries was in 1597, the year of the *Midsummer Night's Dream*. Do we not see here a Malthusian crisis, the effect of a rapid growth of population impinging on an insufficiently expansive economy; such as perhaps we see also in the fall that set in again around 1750, until this time a commercial and industrial revolution came to save Britain from the fate of Ireland?

The London School of Economics.

APPENDIX A

LIST OF PRICE SERIES

ABBREVIATIONS

AS: Annual Statements of the Trade of the U.K.

B: Sir Wm. Beveridge and others: Prices and Wages in England from the Twelfth to the Nineteenth Century. Vol. I.

BPP: British Parliamentary Papers.

JRSS: Journal of the Royal Statistical Society, annual reports on wholesale prices by the Editor of *The Statist*.

PWH: Price and Wage History Research, manuscript materials, collected under the direction of Sir Wm. Beveridge, in the Institute of Historical Research, University of London.

R: J. E. Thorold Rogers: A History of Agriculture and Prices in England.

TN: Tooke and Newmarch: A History of Prices and of the State of the Circulation from 1792 to 1856.

WRP: Report on Wholesale and Retail Prices in the U.K., BPP 1903, LXVIII, 321.

DATES

Dates given for series record the length used here, either as a component of the final index or for splicing; the original is sometimes longer. We have entered the average price for a harvest year against the calendar year beginning during that harvest year, e.g. against Mich. 1400—Mich. 1401 we put the calendar year 1401.

SERIES

(01) *Wheat 1264–1703:* average of prices recorded, mostly in manorial and college accounts, in Southern England. R, I, 226–234; IV, 282–290; V, 268–274. (02) *Wheat 1583–1770:* mean of prices at Lady Day and Michaelmas, found in Oxford college accounts of payments of rent in kind. TN, VI, 427–436, from W. F. Lloyd, 1830. (03) *Wheat 1595–1826:* mean of prices at Lady Day and Michaelmas, taken by Eton College from the Windsor market, for the purpose of rent audit. 1595–1770, TN, VI, 352. 1646–1826, TN, II, 387–9. (04) *Wheat 1631–1818:* annual averages of prices paid by Winchester College. B, 18, 81–84. (05) *Wheat 1771–1954:* Gazette Average prices, England and Wales, weekly since 24 Nov. 1770 in the London Gazette, here from: 1771–1841, " Porter's Tables ", XI, 69 (BPP 1843, LVI); 1842–1902, WRP, 70–71; 1903–54, Statistical Abstract of the U.K. (06) *Wheat 1854–1907:* average value of wheat imported into the U.K.: 1854–70, " computed real values "; 1871+, " declared values ". WRP, 80; and AS. (07) *Wheat 1905–52:* market quotations for Northern Manitoba Wheat, No. 1 except 1924–38, when No. 2. Price at 1st Jan. 1906–12; thereafter at " end year "; price at 1st Jan., 1906 taken here as for end year 1905, and so on. *The Economist*, Annual Commercial History and Review, through 1953, then British Wholesale Prices. (08) *Barley 1264–1833:* average of prices recorded, mainly in manorial, college and church accounts, and in southern and eastern counties, but Durham included 1341–1541, and some northern counties 1771–1822. Entries sparse 1542–1728. PWH. (09) *Rye 1264–1540, 1688–1782:* same origins as 08; mainly Winchester manors and eastern counties down to 1454; 1455–1540 Dorset and Durham only; from 1688 Kent and Middlesex. PWH. (10) *Peas 1264–1685:* same origins as 01. R, I, 227–235; IV, 283–291; V, 269–275. (11) *Peas 1686–1790:* average price at which Navy Victualling bought peas under short-period contracts. B, 538–9, 567–9. (12) *Peas 1791–1809:* presumably for England and Wales; from " An Account of the Average Price of all sorts of Grain in each Year ", 1791–1821, BPP 1821, XVII, 11. (13) *Peas 1810–1833:* London Gazette Average prices, England and Wales, taken here from " Porter's Tables ", XI, 69 (BPP, 1843, LVI). (14) *Potatoes 1762–1830:* average price of old potatoes bought by the Lord Steward's department. B, 374–6, 427. (15) *Potatoes 1832–45:* 1832–36, middlings and middling whites from Borough and Spitalfields markets; 1837–45 Yorkshire reds, 1846–50 Yorkshire Regents, at Southwark Waterside. Averages of weekly quotations for October in each year, given in *The Christian Advocate* and *Mark Lane Express*. (16) *Potatoes 1846–84:* average of prices in Jan.-Apr. and Sept.-Dec. annually, of good English, mostly Kent Regents. A. Sauerbeck, " Prices of Commodities and the Precious Metals ", JRSS, XLIX (1886), 636. (17) *Potatoes 1885–1954:* London wholesale prices, grade A or good English. *The Economist*. (18) *Porci 1264–1460:* same origins as 01. 1264–1401, annual averages from R, I, 342–50. 1402–60, median or mean of entries from southern and eastern

counties, in R, III, 122–202. (19) *Muttons 1265–1582:* same origins as 01. 1265–1401, median of entries from southern and eastern counties, in R, II, 184–269. 1402–1582, 3-year moving average of highest price found in each year, reduced by a quarter throughout; a few exceptionally high entries omitted. R, IV, 346–54. (20) *Beef 1584–1659:* purchases by King's College, Cambridge; apparently annual averages. R, V, 347–51. (21) *Beef 1587–1767:* purchases by St. Bartholomew's Hospital, Sandwich, in August of each year. B, 219–21, 236–7. (22) *Beef 1602–21:* purchases by estate of Theydon Gernon, Essex; apparently annual average. R V, 356. (23) *Mutton 1602–1700:* purchases of mutton by Eton College from the college butcher; annual averages. B, 112, 144–6. (24) *Mixed beef and mutton 1613–87:* purchases by Winchester College: weighted average of prices for the two kinds, including *ex gratia* payments to the butcher to compensate for losses. B, 33–5, 81–3. (25) *Beef 1683–1797:* Beef for salting bought by Navy Victualling, London. 1683-1747, from Arthur Young, Political Arithmetic, pp. 139–141, apparently annual averages; 1748–97, annual average of varying number of monthly entries in B, 548–53, 568–72. (26) *Beef 1688–1833:* purchases by St. Thomas's Hospital, Southwark; average of prices at Lady Day and Michaelmas. "Porter's Tables", BPP, 1835, XLIX, 390. (27) *Mutton 1701–1831:* market prices used to fix the money payments due from tenants of Eton College farms in lieu of rent sheep; average of prices at Lady Day and Michaelmas. B, 112, 146–7. (28) *Mutton 1725–1833:* as for 26. (29) *Beef 1789–1865:* annual average of monthly price (from 1792 mean of highest and lowest price on a day near end of month) at Smithfield market, London: extracted by Dr. A. H. John from contemporary sources (from 1796 onwards, the *Gentleman's Magazine*). (30) *Mutton 1796–1865:* as for 29 from 1796 onwards. (31) *Beef 1858–1954:* 1858–1914, mean of highest and lowest prices of inferior middling butcher's meat, Newgate or Smithfield, at beginning of each year: 1913–27, mean of prices of middling and prime at end of year; 1924–47, imported chilled hindquarters (Argentine 1924–38, New Zealand 1939–47); 1948 onwards, "beef imported". *The Economist*, Annual Commercial History and Review through 1953, then British Wholesale Prices. (32) *Mutton 1858–1954:* 1858–90, mean of highest and lowest prices for middling butcher's meat, Newgate or Smithfield, and 1891–1914, price of middling, at beginning of year throughout; 1913–27, mean of middling and prime at end of year; 1924–54, imported (1924–38 New Zealand frozen wethers) at end of year. *The Economist*, Annual Commercial History and Review through 1953, then British Wholesale Prices. (33) *Herrings 1264–1400:* kind not specified; most of earlier entries from E. Anglia, and of later from monastic accounts esp. Wolrichston in Warwickshire. R, I, 635–640. (34) *White Herrings 1404–1590:* generally bought at Stourbridge fair. Through 1583, R, IV, 540–544; 1584–90, from entries in R, VI, 392–4. (35) *Red Herrings 1405–1561:* generally bought at Stourbridge fair. R, IV, 540–544. (36) *Haberden (salt cod) 1584-1703:* mostly from King's College, Cambridge, and probably mostly bought at Stourbridge fair. R, V, 427–8. (37) *Crimped (dried) cod 1783–1830:* Lord Steward's dept. B, 369–71, 370. (38) *Fresh cod 1783–1830:* Lord Steward's dept. B, 369–71, 420–1. (39) *Herrings 1827–1902:* average declared value per barrel exported, 1827–39, from "Porter's Tables" in various BPP, 1836–43; 1840–1902, WRP, 158. (40) *Herrings 1898–1938, 1945–54:* average value per cwt. of British takings landed. Annual Reports on Sea Fisheries, later Sea Fisheries Statistical Tables, of Board, later Ministry, of Agriculture. (41) *Cod 1898–1938, 1945–54:* as for 40. (42) *Cheese 1264–1429:* same origins as 01; numerous gaps in 14th century; 1401–1429, Hornchurch (Essex) only. R, I, 430–5; III, 209–212. (43) *Cheese 1573–1752:* Suffolk cheese bought by St. Bartholomew's Hospital, Sandwich. Numerous gaps. B, 223–5, 238–40. (44) *Cheese 1684–1758:* Suffolk cheese bought by Navy Victualling, London. B, 555–6, 576. (45) *Cheese 1703–96:* Gloucester cheese bought by Chelsea Hospital, London. B, 308, 313. (46) *Cheese 1713–1824:* Gloucester cheese bought by Greenwich Hospital. B, 261, 293, 295. (47) *Cheese 1756–1827:* Cheshire cheese bought by Navy Victualling, London. B, 555–6, 576. (48) *Cheese 1815–1902:* cheese (unspecified) bought by Bethlem Royal Hospital, London. Contract price 1815–71, thereafter open market. WRP, 150. (49) *Cheese 1854–1954:* average value per cwt. of cheese imported into U.K. AS. (50) *Butter 1264–1379:* same origins as 01. R, I, 430–434. (51) *Butter 1561–1702:* 1561–83, Oxford city accounts; 1584–1702, average of prices recorded mostly by New College Oxford, King's College, Cambridge, and Winchester. R, III, 217–8; V, 372–8. (52) *Butter 1659–1767*: fresh butter bought by St. Bartholomew's Hospital, Sandwich. B, 222–3, 236. (53) *Butter 1684–1827:* purchases by Navy Victualling, London. B, 555, 576. (54) *Butter 1805–1902:* contract prices paid by Royal Hospital, Greenwich. WRP, 139. (55) *Butter 1815–1902:* contract prices 1815–71, market prices 1872–1902, paid by Bethlem Royal Hospital, London. WRP, 140. (56) *Butter 1886–1954:* average value of butter imported into the U.K. AS. (57) *Malt 1266–1703:* specified as "first quality" through 1401, unspecified afterwards; same origins as 01. R, I, 227–235; IV, 283-291; V, 268-274. (58) *Malt 1596–1832:* Windsor market prices, average of Michaelmas and Lady Day, recorded by Eton College for assessing money due in lieu of malt rents. B, 111, 144–147. (59) *Malt 1684–1827:* price paid by Navy Victualling, London. B. 547–8, 574–5. (60) *Malt 1805–65:* contract price paid by Royal Hospital, Greenwich. J. R. McCulloch, Dictionary of Commerce (1882 edn.), 1138–40. (61) *Malt 1863–1954:* average declared value of exports. AS. (62) *Hops 1559–1594:* mainly Flemish; price paid by Eton College. B, 108, 143–4. (63) *Hops 1584–1703:* English; mainly Eton and King's College, Cambridge, with Winchester coming in from 1644. R, V, 289–301. (64) *Hops 1684–1827:* kind unspecified; bought by Navy Victualling, London. B, 539–40, 567–569. Some gaps filled according to movement of Greenwich Hospital price, B, 254–5, 292, 294. (65) *Hops 1805–64:* average contract price paid by Royal Hospital, Greenwich. WRP, 88. (66) *Hops 1854–1914:* average declared value of imports. AS. (67) *Hops 1906–54:* index no. of average price of home-grown hops. Ministry of Agriculture: Agricultural Statistics. (68) *Sugar 1689–1771:* brown, bought by Navy Victualling, London. Gaps after 1750 filled by reference to Navy Victualling, Plymouth. B, 557–8, 565. (69) *Sugar 1765–1831:* powder or Lisbon, bought by Lord Steward's dept. B, 383–5, 429–431. (70) *Sugar 1820–1954:* average declared export value. 1820–1902, WRP, 165; 1903–54, AS. (71) *Tea 1801–71:* average price in bond. WRP, 176–7. (72) *Tea 1854–1954:* average declared value of imports. 1854–1902, WRP, 173; 1903–54, AS. (73) *Charcoal 1441–1583:* mostly at Oxford and Cambridge. R, IV, 383–7. (74) *Charcoal 1442–1583:* as for 73. R, IV, 383-7. (75) *Charcoal 1551–1785:* price paid by Eton College. B, 119–22, 143–7. (76) *Charcoal 1584–1703:* at Oxford or Winchester. R, V, 398–405. (77) *Charcoal*

1584–1703: at Cambridge, mainly King's College. R, V, 398–405. (78) *Charcoal 1609–47:* at Oxford. R, V, 398–401. (79) *Charcoal 1576–1785:* price paid by Westminster (School and Abbey). B, 177–8, 193–5. (80) *Coal 1584–1703:* usually Newcastle coal, bought at Cambridge, mostly by King's College. R, V, 398–404. (81) *Coal 1586–1831:* bought for Westminster (School and Abbey) brewery 1586–1619, College 1620–1831. B, 173–7, 193–6. (82) *Coal 1654–1832:* bought for Eton College brewery. B, 116–9, 145–7. (83) *Coal 1717–1902:* Newcastle coal delivered Royal Naval Hospital, Greenwich. B, 264–7, 294–5. (84) *Coal 1846–1954:* price in London of Wallsend Hetton, 1846–1916, best Yorkshire house coal after 1916: JRSS. (85) *Candles 1321–1703:* same origins as 01. R, I, 439–44; IV, 376–80; V, 398–404. (86) *Candles 1645–1831:* price paid by Eton College, less tax. B, 128–9, 145–7. (87) *Candles 1703–1811:* price paid by Chelsea Hospital, less tax. B, 311–2, 313. (88) *Candles 1713–1868:* price paid by Greenwich Hospital, less tax. B, 271, 293–5. J. R. McCulloch, Dictionary of Commerce, 1138–40. (89) *Tallow 1846–1910:* town. JRSS. (90) *Oil 1402–1535:* olive and rape oil, mainly at Oxford and Cambridge. R, IV, 376–9. (91) *Oil 1567–1783:* train-oil bought for Naval Stores. B, 633–4, 670–4, 680. (92) *Oil 1783–1853:* Northern (1783–1839), Southern (1840–53), oil, without casks. TN, II, 394–5, 407; III, 297; IV, 430; VI, 504. (93) *Oil 1854–1880:* price exclusive of duty of train or blubber oil, from the Northern whale fishery and British North America: AS. (94) *Oil 1856–1912:* average import value of petroleum, illuminating and lubricating: AS. (95) *Oil 1903–54:* average import value of petroleum, lamp oil, later called Kerosene (burning oil): AS. (96) *Gas 1876–1954:* price paid by domestic consumers: 1876–1937, mean of prices of three London gas companies. Report from the Select Committee on Gas Undertakings, BPP, 1918, III, appx. 4. 1949–54, price of North Thames Gas Board, from Annual Reports; rise 1937–49 distributed by years according to rise in price of coal. (97) *Canvas 1265–1583:* same origins as 01. R, I, 587–92; IV, 583–88. (98) *Shirting 1402–1583, Sheeting or Shirting 1584–1701:* same origins as 01. R, IV, 583–88; V, 561–4. (99) *Linen and Canvas 1506–1673*: price paid by Eton College. B, 131–2, 143–5. (100) *Cloth 1394–1624:* bought by Winchester College for scholars and servants. B, 45–6, 85–89, 90. (101) *Cloth 1394–1554:* bought by Winchester College for fellows, stewards and others. B, 46–7, 85–7. (102) *Cloth 1402–1583:* average of three qualities of cloth, bought mainly by New College, Oxford and King's College, Cambridge. R, IV, 583–8. (103) *Cloth 1576–1757:* broad cloth bought for scholars of Westminster School. B, 182, 193–6. (104) *Cloth 1615–1757:* bought for scholars and choristers of Eton College. B, 130–1, 144–7. (105) *Cloth 1748–1829:* blue cloth bought by Greenwich Hospital. B, 273, 293, 295. (106) *Yarn, woollen and worsted, 1831–1954:* average declared value of exports. 1831–9, " Porter's Tables " in BPP; then AS. (107) *Cotton cloth* 1812–60: average price paid by printers per piece of 7/8–72 reed printing cloth. JRSS, 1861, 491–7. (108) *Cotton cloth 1858–1954:* 1858–1906, mean of 26 in. 66 reed printer's cloth and 40 in. 66 reed shirting; 1897–1950, 38 in. or 39 in. shirting; 1949–54, a printer's cloth. *The Economist*, Annual Commercial History and Review.

APPENDIX B

INDEXES (1451–75 = 100) OF (1) PRICE OF COMPOSITE UNIT OF CONSUMABLES ; (2) EQUIVALENT OF WAGE-RATE OF BUILDING CRAFTSMAN, EXPRESSED IN THE ABOVE COMPOSITE PHYSICAL UNIT ; IN SOUTHERN ENGLAND, 1264–1954.

	(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)
1260			1300	113	44	1340	96	52	1380	106	78
1261			1301	89	—	1341	86	58	1381	119	70
1262			1302	93	—	1342	85	59	1382	111	75
1263			1303	89	—	1343	84	60	1383	108	77
1264	83	60	1304	94	62	1344	97	52	1384	116	72
1265	80	63	1305	97	60	1345	98	51	1385	112	74
1266	83	60	1306	100	58	1346	88	57	1386	104	80
1267	—	—	1307	94	62	1347	109	46	1387	100	83
1268	70	71	1308	105	55	1348	116	43	1388	102	81
1269	83	60	1309	119	—	1349	97	52	1389	100	83
1270	—	—	1310	135	—	1350	102	49	1390	106	78
1271	98	51	1311	123	54	1351	134	—	1391	133	62
1272	130	38	1312	108	62	1352	160	—	1392	104	80
1273	98	51	1313	101	66	1353	138	—	1393	100	83
1274	95	53	1314	112	60	1354	117	—	1394	101	82
1275	100	50	1315	132	51	1355	115	—	1395	93	89
1276	96	52	1316	216	31	1356	121	—	1396	99	84
1277	97	52	1317	215	31	1357	133	—	1397	116	72
1278	103	49	1318	154	44	1358	139	—	1398	121	69
1279	94	53	1319	119	56	1359	126	—	1399	113	73
1280	94	53	1320	106	63	1360	135	61	1400	104	80
1281	93	54	1321	121	55	1361	131	63	1401	130	64
1282	104	48	1322	141	48	1362	153	54	1402	127	65
1283	111	45	1323	165	41	1363	155	54	1403	119	—
1284	120	42	1324	137	49	1364	151	55	1404	99	—
1285	83	60	1325	127	53	1365	143	58	1405	99	—
1286	91	55	1326	124	54	1366	121	69	1406	100	—
1287	91	55	1327	96	70	1367	137	61	1407	99	—
1288	72	69	1328	96	70	1368	139	60	1408	107	—
1289	69	72	1329	119	56	1369	150	55	1409	120	—
1290	80	63	1330	120	56	1370	184	45	1410	130	—
1291	106	47	1331	134	50	1371	164	51	1411	106	—
1292	96	52	1332	131	51	1372	132	63	1412	103	97
1293	93	54	1333	111	60	1373	131	63	1413	108	93
1294	110	45	1334	99	68	1374	125	66	1414	108	93
1295	131	38	1335	96	70	1375	125	66	1415	115	87
1296	104	48	1336	101	66	1376	146	57	1416	124	81
1297	93	54	1337	111	60	1377	112	74	1417	129	78
1298	106	47	1338	85	—	1378	95	87	1418	114	88
1299	96	52	1339	79	—	1379	94	88	1419	95	105

APPENDIX B—*Continued*

	(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)
1420	102	98	1470	102	98	1520	137	73	1570	300	56
1421	93	108	1471	103	97	1521	167	60	1571	265	63
1422	97	103	1472	104	96	1522	160	63	1572	270	62
1423	108	93	1473	97	103	1523	136	74	1573	274	61
1424	103	97	1474	95	105	1524	133	75	1574	374	—
1425	109	92	1475	90	111	1525	129	78	1575	—	—
1426	103	97	1476	85	118	1526	133	75	1576	309	—
1427	96	104	1477	81	123	1527	147	68	1577	363	—
1428	99	101	1478	89	112	1528	179	56	1578	351	—
1429	127	79	1479	97	103	1529	159	63	1579	326	—
1430	138	72	1480	103	97	1530	169	59	1580	342	58
1431	115	87	1481	115	87	1531	154	65	1581	347	58
1432	102	98	1482	145	69	1532	179	56	1582	343	58
1433	112	89	1483	162	62	1533	169	—	1583	324	62
1434	109	92	1484	128	78	1534	145	—	1584	333	60
1435	105	95	1485	99	101	1535	131	—	1585	338	59
1436	95	105	1486	86	116	1536	164	—	1586	352	57
1437	93	108	1487	103	97	1537	155	—	1587	491	41
1438	128	78	1488	110	90	1538	138	—	1588	346	58
1439	154	65	1489	109	92	1539	147	—	1589	354	56
1440	140	71	1490	106	94	1540	158	—	1590	396	51
1441	93	108	1491	112	89	1541	165	—	1591	459	44
1442	85	118	1492	103	97	1542	172	—	1592	370	54
1443	97	103	1493	117	85	1543	171	—	1593	356	56
1444	102	98	1494	96	104	1544	178	—	1594	381	52
1445	87	115	1495	89	112	1545	191	—	1595	515	39
1446	95	105	1496	94	106	1546	248	—	1596	505	40
1447	100	100	1497	101	99	1547	231	—	1597	685	29
1448	102	98	1498	96	104	1548	193	61	1598	579	35
1449	106	94	1499	99	101	1549	214	—	1599	474	42
1450	102	98	1500	94	106	1550	262	—	1600	459	44
1451	109	92	1501	107	93	1551	285	—	1601	536	37
1452	97	103	1502	122	82	1552	276	48	1602	471	42
1453	97	103	1503	114	88	1553	259	—	1603	448	45
1454	105	95	1504	107	93	1554	276	—	1604	404	50
1455	94	106	1505	103	97	1555	270	—	1605	448	45
1456	101	99	1506	106	94	1556	370	—	1606	468	43
1457	93	108	1507	98	102	1557	409	—	1607	449	45
1458	99	101	1508	100	100	1558	230	—	1608	507	39
1459	95	105	1509	92	109	1559	255	—	1609	559	36
1460	97	103	1510	103	97	1560	265	—	1610	503	40
1461	117	85	1511	97	103	1561	283	59	1611	463	43
1462	115	87	1512	101	99	1562	266	63	1612	524	38
1463	88	114	1513	120	83	1563	—	—	1613	549	36
1464	86	116	1514	118	85	1564	—	—	1614	567	35
1465	108	93	1515	107	93	1565	290	58	1615	561	36
1466	109	92	1516	110	90	1566	287	58	1616	562	36
1467	108	93	1517	111	90	1567	282	59	1617	537	37
1468	106	94	1518	116	86	1568	281	59	1618	524	38
1469	107	93	1519	129	78	1569	276	61	1619	494	40

APPENDIX B—*Continued*

	(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)
1620	485	41	1670	577	52	1720	635	58	1770	714	56
1621	461	43	1671	595	50	1721	604	61	1771	775	52
1622	523	38	1672	557	54	1722	554	66	1772	858	47
1623	588	34	1673	585	51	1723	525	70	1773	855	47
1624	543	37	1674	650	46	1724	589	62	1774	863	—
1625	534	37	1675	691	43	1725	610	60	1775	815	—
1626	552	36	1676	652	46	1726	637	58	1776	797	61
1627	496	40	1677	592	51	1727	596	62	1777	794	61
1628	466	43	1678	633	47	1728	649	57	1778	826	58
1629	510	39	1679	614	49	1729	681	54	1779	756	64
1630	595	—	1680	568	53	1730	599	61	1780	730	66
1631	682	—	1681	567	53	1731	553	—	1781	760	64
1632	580	—	1682	600	50	1732	557	—	1782	776	62
1633	565	—	1683	587	51	1733	544	—	1783	869	56
1634	611	—	1684	570	53	1734	518	—	1784	874	55
1635	597	—	1685	651	46	1735	529	—	1785	839	58
1636	593	—	1686	559	54	1736	539	74	1786	839	58
1637	621	—	1687	580	52	1737	581	69	1787	834	58
1638	707	—	1688	551	—	1738	563	71	1788	867	56
1639	607	—	1689	535	—	1739	547	73	1789	856	56
1640	546	—	1690	513	—	1740	644	62	1790	871	55
1641	586	—	1691	493	—	1741	712	56	1791	870	55
1642	557	48	1692	542	—	1742	631	63	1792	883	—
1643	553	—	1693	652	—	1743	579	69	1793	908	—
1644	531	—	1694	693	—	1744	518	77	1794	978	—
1645	574	—	1695	645	—	1745	528	76	1795	1091	—
1646	569	—	1696	697	—	1746	594	67	1796	1161	52
1647	667	—	1697	693	—	1747	574	70	1797	1045	57
1648	770	—	1698	767	—	1748	599	67	1798	1022	59
1649	821	—	1699	773	—	1749	609	66	1799	1148	52
1650	839	—	1700	671	—	1750	590	68	1800	1567	38
1651	704	—	1701	586	57	1751	574	70	1801	1751	34
1652	648	—	1702	582	—	1752	601	67	1802	1348	45
1653	579	—	1703	551	—	1753	585	68	1803	1268	—
1654	543	—	1704	587	—	1754	615	65	1804	1309	—
1655	531	56	1705	548	—	1755	578	69	1805	1521	—
1656	559	54	1706	583	—	1756	602	66	1806	1454	49
1657	612	49	1707	531	—	1757	733	55	1807	1427	50
1658	646	46	1708	571	—	1758	731	55	1808	1476	49
1659	700	43	1709	697	—	1759	673	59	1809	1619	44
1660	684	44	1710	798	46	1760	643	62	1810	1670	48
1661	648	46	1711	889	41	1761	614	65	1811	1622	49
1662	769	39	1712	638	58	1762	638	63	1812	1836	44
1663	675	44	1713	594	62	1763	655	61	1813	1881	43
1664	657	46	1714	635	58	1764	713	56	1814	1642	49
1665	616	49	1715	646	57	1765	738	54	1815	1467	55
1666	664	45	1716	645	57	1766	747	54	1816	1344	60
1667	577	52	1717	602	61	1767	790	51	1817	1526	52
1668	602	50	1718	575	64	1768	781	51	1818	1530	52
1669	572	52	1719	609	60	1769	717	56	1819	1492	54

APPENDIX B—*Continued*

	(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)
1820	1353	59	1860	1314	68	1900	994	134	1940	1574	222
1821	1190	67	1861	1302	72	1901	986	135	1941	1784	206
1822	1029	78	1862	1290	72	1902	963	138	1942	2130	176
1823	1099	73	1863	1144	82	1903	1004	133	1943	2145	183
1824	1193	67	1864	1200	78	1904	985	135	1944	2216	184
1825	1400	57	1865	1238	—	1905	989	135	1945	2282	186
1826	1323	60	1866	1296	82	1906	1016	131	1946	2364	208
1827	1237	65	1867	1346	79	1907	1031	129	1947	2580	210
1828	1201	67	1868	1291	82	1908	1043	128	1948	2781	198
1829	1189	67	1869	1244	86	1909	1058	126	1949	3145	178
1830	1146	70	1870	1241	86	1910	994	134	1950	3155	180
1831	1260	63	1871	1320	81	1911	984	135	1951	3656	170
1832	1167	69	1872	1378	—	1912	999	133	1952	3987	167
1833	1096	73	1873	1437	84	1913	1021	131	1953	3735	187
1834	1011	79	1874	1423	84	1914	1147	124	1954	3825	194
1835	1028	78	1875	1310	92	1915	1317	114			
1836	1141	70	1876	1370	88	1916	1652	94			
1837	1169	68	1877	1330	90	1917	1965	87			
1838	1177	68	1878	1281	94	1918	2497	80			
1839	1263	63	1879	1210	99	1919	2254	126			
1840	1286	62	1880	1174	102	1920	2591	154			
1841	1256	64	1881	1213	99	1921	2048	167			
1842	1161	69	1882	1140	105	1922	1672	164			
1843	1030	78	1883	1182	102	1923	1726	159			
1844	1029	78	1884	1071	112	1924	1740	172			
1845	1079	74	1885	1026	117	1925	1708	176			
1846	1122	71	1886	931	129	1926	1577	190			
1847	1257	65	1887	955	126	1927	1496	201			
1848	1105	74	1888	950	126	1928	1485	202			
1849	1035	79	1889	948	127	1929	1511	199			
1850	969	84	1890	947	127	1930	1275	229			
1851	961	85	1891	998	120	1931	1146	247			
1852	978	84	1892	996	120	1932	1065	266			
1853	1135	79	1893	914	137	1933	1107	248			
1854	1265	71	1894	982	127	1934	1097	251			
1855	1274	71	1895	968	129	1935	1149	254			
1856	1264	71	1896	947	132	1936	1211	248			
1857	1287	70	1897	963	130	1937	1275	242			
1858	1190	76	1898	982	127	1938	1274	249			
1859	1214	74	1899	950	140	1939	1209	269			

Post-war Wage Bargaining in the United States

By H. M. Douty

This paper seeks briefly to state the present position of trade unionism in the American economy; to analyse the general magnitude of the post-war wage movement, with particular emphasis on wages, productivity, and prices in the four years 1952–55, when the level of retail prices remained substantially stable; and to describe what appear to be the principal developments in post-war collective bargaining.

I

In December, 1955, a twenty-year division in the American trade union movement was closed with the merger of the American Federation of Labor and the Congress of Industrial Organisations. Despite the fact that there were no basic ideological differences between the two trade union centres, this merger was an extraordinary achievement.[1] Its immediate result is to make possible consolidation of the large gains in union organisation that have taken place in the United States since the mid-1930's.

At the beginning of 1955, unions affiliated with the American Federation of Labor had about 10·9 million members; the membership of affiliates of the Congress of Industrial Organisations numbered approximately 5·2 million. An additional 1·8 million workers were enrolled in unaffiliated unions. This total of 18 million members of A.F.L., C.I.O., and unaffiliated national and international unions includes slightly more than one million members located outside of the continental United States, principally in Canada.[2]

Among employees of non-agricultural establishments—that is, among those employees most " susceptible " to union organisation—union membership now accounts for about one employee in three. In 1929, the proportion was one in ten. This striking increase during a quarter of a century in relative trade union strength was achieved largely in two great waves of organisation during the mid-1930's and the World War II period. During the past decade union membership has increased in absolute terms but not as a proportion of non-farm employment.[1]

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[1] For an excellent account of the unity convention, see Joseph W. Bloch, " Founding Convention of the AFL-CIO ", *Monthly Labor Review*, February, 1956, pp. 141–149.

[2] These data are from U.S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1185, *Directory of National and International Labor Unions in the United States, 1955*, Washington, D.C., 1955, p. 9. There are formidable problems in the definition and measurement of union membership, and the above figures should be viewed as approximations.

Unionism has established itself strongly in many of the strategic sectors of the economy. In manufacturing, production workers are well organised in most of the basic industries, including iron and steel, automobiles, shipbuilding, rubber, glass, paper, apparel, and in substantial segments of electrical and non-electrical machinery. Unionism is also deeply entrenched in a wide variety of non-manufacturing industries : communications, electric and gas utilities, mining, truck, bus, airline, and railroad transportation, on the docks and in maritime industries generally, and in construction. Unionism is weak in the United States largely among those occupational groups and industries which, for a variety of reasons, tend everywhere to be weakly organised. It has little direct significance among office and salaried professional employees. It is comparatively unimportant in many sections of retail trade, in finance, in many of the service industries, and in large areas of government employment. Even in manufacturing, some industries, such as cotton and synthetic textiles, are predominantly non-union.

But the centres of its power are such that trade unionism plainly constitutes an important force in American economic life. The wages and conditions of work of millions of employees in many key sectors of the economy are arrived at through the collective bargaining process. Moreover, the influence of the terms of collective bargaining settlements undoubtedly extends far beyond the orbit of their direct application.

II

Trade unionism in the United States has a rich and varied history extending over a period of more than 150 years. The American Federation of Labor itself has functioned since 1881 ; some individual unions have a longer continuous history. American trade unionism has been essentially an indigenous development, a response to the dynamic economic and social factors that have shaped American industry. The trade union movement has, by and large, developed its own leadership, formulated its own philosophy, devised its own structure of internal organisation and government, and elaborated its own pattern of relationships with employers.

One key fact is required for the understanding of American trade unionism ; namely, its reliance predominantly upon collective bargaining to advance labour standards. It is true that this reliance has never been absolute and in recent decades has been substantially modified. In particular, the unions now tend to place an overriding responsibility upon government for the maintenance of a high general level of economic activity, and for the operation of basic social security programmes. An increased preoccupation with government, and with politics in its broadest sense, arises also from the development by the Federal government of a national policy relating to trade union organisation and collective bargaining.[1]

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[1] The question of whether the present stabilisation of union membership relative to the non-farm labour force is likely to continue is one of considerable interest. See the discussion of " Union Growth " by Irving Bernstein, Daniel Bell, Lloyd Ulman, and Russell Allen in *Annual Proceedings*, Industrial Relations Research Association, 1954, pp. 202-246.

Nevertheless, collective bargaining retains much of its historic role as the central device of American trade unionism for protecting and advancing the interests of workers. In a careful statement in 1955 of trade union perspectives and policy, George Meany, now president of the combined A.F.L.-C.I.O., wrote:

> Imperfect in many details as our system may be, this country has adopted a flexible method for increasing the standard of living while maintaining freedom. It is the method of voluntary collective bargaining, of free decision-making outside the coercions of government, in the solution of economic disagreement. And it is through the give and take of collective bargaining that we seek to achieve our goals.[2]

Mr. Meany specifically rejected such devices as co-determination on the German model as inapplicable to American conditions. He noted, however, the marked expansion that has taken place in recent years in the scope of bargaining, and indicated the difficulty of drawing a precise line separating those decisions falling exclusively within the province of management from those requiring joint determination.

There are many similarities between British and American trade unionism, but there are also important differences.[3] One of the differences may be noted briefly, for it points to an important difference of substance in wage bargaining in the two countries. As compared with Great Britain, nation-wide industry bargaining in the United States is comparatively rare.[4] There is nothing in the United States that remotely resembles the bargaining arrangement between the Engineering and Allied Employers' National Federation and the Confederation of Shipbuilding and Engineering Unions for the heterogeneous group of industries that comprise British engineering.[5] Nor are there many examples in the United States of nation-wide bargaining for industries more narrowly and precisely defined. Bargaining in the United States takes place predominantly between the appropriate unions and single-plant or multi-plant companies,[1] or with associations of employers in particular industries in, typically, small geographical areas, such as a city. Although thousands of collective bargaining agreements are negotiated with single-plant companies or for single establishments of multi-plant companies, a 1950 study suggests that multi-plant (same employer) and multi-employer bargaining units account for a substantial majority of workers under union agreements.[2]

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[1] This policy is embodied in the Labor-Management Relations (Taft-Hartley) Act. See Harry A. Millis and Emily Clark Brown, *From the Wagner Act to Taft-Hartley*, Chicago, 1950.

[2] George Meany, " What Labor Means by ' More '," *Fortune*, March, 1955, pp. 92–93, 172, 174, 176.

[3] Some of the British influences on American trade unionism are suggested by Rowland Tappan Berthoff, *British Immigrants in Industrial America*, Cambridge, Mass., 1953, ch. 7.

[4] For an analysis of the " unit " of bargaining in the United States see Neil W. Chamberlain, *Collective Bargaining*, New York, 1951, ch. 8.

[5] For an interesting account of collective bargaining in British engineering, together with examples of how problems are met at the local plant level, see Milton Derber, *Labor-Management Relations at the Plant Level Under Industry-Wide Bargaining*, Urbana, Illinois, 1955

It appears, in substance, that in the United States, as compared with Great Britain, collective bargaining focuses much more on the individual enterprise or at least on closely related groups of enterprises. This allows room, at any rate in the short run, for differences in settlements to take account of differences in the economic circumstances of firms; it also provides considerable scope for experimentation and novelty in the terms of settlement. Where problems of wage structure exist, bargaining tends to be directly concerned not only with changes in the general level of wages, but also with the internal alignment of rates. The local union, which often is actively involved in negotiations and has responsibility for administering the collective bargaining contract, tends to gain in vitality from the discharge of these functions.[3]

Although collective bargaining is comparatively decentralised in the United States, there obviously are tendencies making for a measure of uniformity in the terms of wage agreements. There is, first, the pervasive influence of labour market forces which provide the general framework within which negotiations are carried on. Second, there exists a strong tendency for a union to press, where possible, for substantial uniformity of terms within the area of its own jurisdiction. Third, some wage settlements are vastly more important than others and serve as " key " agreements to which a variety of other settlements tend to be geared.[4]

There is no central policy on wages in American trade unionism. The individual unions, in a variety of ways, formulate bargaining positions from time to time in the light of general economic conditions and of circumstances in their particular industries. The general process has been described as follows:

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[1] Not all multi-plant companies, even though completely unionised, bargain on a company-wide basis.

[2] James C. Nix and Laura C. Chase, " Employer Unit in Collective Bargaining ", *Monthly Labor Review*, December, 1950, pp. 695–697.

[3] The American trade union local or branch is ordinarily composed of workers employed by a single establishment or firm and not, as is widely the case in Great Britain, of workers from a number of different plants. This structural difference has important consequences. The apparatus of shop stewards more or less divorced from the local union is not found in the United States, where the worker secures his representation at the plant level directly through his local union. This means in turn that the local union in the United States tends to be immediately and directly concerned with all aspects of the collective agreement, including all of the terms of the wage bargain.

[4] It was in recognition of the " key " nature of some agreements that the Bureau of Labor Statistics inaugurated its wage chronology series, consisting of historical summaries of general changes in wages and related benefits in major bargaining situations. About 40 of these chronologies are now available. See " The New Wage Chronology Series ", *Monthly Labor Review*, December, 1948, pp. 581–583.

> Wage policy is determined at different levels of union organisation in different unions. In highly decentralised unions such as the teamsters, it may be determined almost entirely by local unions or groups of local unions in a given area. At the opposite extreme, basic wage policy for the United Mine Workers is determined by the national union for the entire bituminous coal industry. In between are many cases in which wage policy is determined by the unions for the leading firms in an industry, which policy for smaller firms is worked out case by case by local unions assisted by field representatives of the national organisation.[1]

If there is any generalisation that can be made it is perhaps to the effect that American unions have become increasingly conscious of the connection between real wages and productivity. Collective bargaining pressures, the unions believe, represent an important factor in the increase in productivity out of which higher wage standards must, for the most part, ultimately come. Such pressures, in their view, lead to a high incidence of what Hicks has called " induced invention ".[2] Thus, as a matter of policy, unions in the United States tend to support technological change, although they are concerned, of course, to devise measures to cushion the human adjustments that changing technology often requires.[3]

Despite recognition of the general importance of productivity, union bargaining strategy tends to be sectional and opportunistic. The unions seek to preserve living standards from deterioration due to increases in the level of consumer prices; beyond this, rising standards are argued for in terms of productivity, ability-to-pay, wage movements or levels in other firms or industries, or other criteria that appear relevant in the particular circumstances. Unions press hard for gains whenever the economic climate and their bargaining position appear favourable. It is this pressure, within the general framework of labour market forces, that now largely shapes the contours of wage development within the United States.

III

The period from the end of World War II through the spring of 1956 was one of vigorous economic expansion in the United States. This expansion, however, was punctuated by two short intervals of mild recession. Taking the post-war period as a whole, the index of industrial production increased by more than 50 per cent. The level of unemployment, except in the two recession periods, rarely exceeded 3 to 4 per cent. of the civilian labour force. Throughout the entire period unemployment was predominantly short-term and transitional in nature and tended to provide a useful measure of flexibility in the labour market.

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[1] Albert Rees, " Union Wage Policies ", in George W. Brooks and Others (editors), *Interpreting the Labor Movement*, Industrial Relations Research Association, 1952, p. 131.

[2] J. R. Hicks, *The Theory of Wages*, London, 1932, p. 125.

[3] For expressions of labour and management attitudes toward the bundle of developments subsumed under the heading of " automation ", see *Automation and Technological Change*, Hearings Before the Subcommittee on Economic Stabilisation of the Congressional Joint Committee on the Economic Report (84th Congress, 1st Session), Washington, D.C., 1955.

With the end of effective wartime wage control in the fall of 1945, the unions began to press their claims with great vigour. The war-induced inflationary pressures of the immediate post-war period, together with the general tempo of economic growth, were in themselves sufficient to ensure a substantial rise in money wages. Between September, 1945 and the end of 1955, both average hourly and average weekly earnings in manufacturing as a whole almost doubled.[1] A portion of this gain in money earnings was offset by higher prices; indeed, the official consumer price index rose by 49 per cent. When this rise in the general level of retail prices is taken into account, the gain in real hourly and weekly earnings over the 10-year period amounted to about 31 per cent. Much of this increase in real earnings occurred after 1951, when money earnings continued to rise and the level of consumer prices remained substantially stable. The average rise in money and real earnings in manufacturing was roughly equalled, and in some cases exceeded, in many non-manufacturing industries (e.g., mining, construction, communications, wholesale and retail trade).

But the data on money wages tell only part of the story. In recent years, the concept of wages in American industry has become immensely complicated by the rise of new forms of compensation. The term " fringe benefits ", which was invented in 1943, has become a shorthand expression for a whole bundle of compensation practices the limits of which are most difficult to define. They include various forms of premium pay, payment for vacations, holidays, and other time not worked, and employer contributions to insurance, health, pension, and supplemental unemployment insurance schemes. A few of the payments supplementary to basic wage rates, notably the premium pay items, are included in the available monthly data on gross hourly and weekly earnings, but employer expenditures on many types of " fringe benefits " are not reflected in the earnings data at all.[2]

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[1] Average hourly earnings in manufacturing increased from $0·987 in September, 1945 to $1·93 in December, 1955; average weekly earnings rose from $40·87 to $79·71. The December 1955 figures are preliminary. As published by the Bureau of Labor Statistics, these earnings data are gross, and include overtime and late-shift premium pay. They provide, however, a good indication of the trend of *wage rates* for this period. A derived index of average hourly earnings *excluding* overtime premium pay and the effects of inter-industry shifts in employment increased by slightly more than 90 per cent. between September, 1945 and December, 1955.

[2] Among the items not reflected are payments for time not worked and expenditures for benefits that contribute to economic security.

Completely satisfactory estimates of average employer expenditures on supplementary benefits are not available. The existing data do indicate, however, that such expenditures are substantial.[1] A recent pilot study by the Bureau of Labor Statistics into problems of the measurement of " fringe " expenditures points out that " over the past 15 years supplementary wage benefits . . . have grown steadily as expenditure items for employers and as sources of income, leisure and security for workers ".[2] This B.L.S. study, which is confined to manufacturing, provides considerable insight into the range of expenditures among establishments on a group of important benefits.[3]

The latter portion of this first post-war decade is of particular interest. The four years beginning with 1952 were characterised by comparative stability in the general level of retail prices. Can this fact be taken to mean that sectional wage bargaining under high-level employment was somehow reconciled during this period with the goal of price stability?

The general prescription for non-inflationary wage movements under full employment is that wage increases should correspond to increases in national productivity. The Bureau of Labor Statistics recently issued productivity indexes for manufacturing for the period 1947–53.[4] In fact, four series of indexes were presented, the primary distinction among them being in the measurement of output. The four indexes show average annual rates of increase in output per man-hour ranging from 3·0 to 3·6 per cent. If we assume that these average rates of increase hold for the four years 1952–55, we get a range of 12·6 to 15·0 per cent. as the increase in productivity for the period.[5]

The average increase in hourly earnings in manufacturing during this period was 17·7 per cent. This does not include increased employer expenditures on such items as pension and health and welfare plans. A conservative estimate of the average increase in such expenditures during the four-year period would be 3 per cent. (about 5 cents an hour) of the January, 1952 average wage rate. Hence, money wage costs in manufacturing advanced by roughly 21 per cent. as against an increase in productivity that could scarcely have exceeded 15 per cent. and which may well have been somewhat lower.

It would appear, therefore, that wages increases, at least in manufacturing, outran productivity increases during 1952–55. The difference over the four-year period was something of the order of 6 to 9 per cent., depending upon which estimate of productivity is used. Moreover, the available data suggest that, on the average, wage increases in non-manufacturing industry as a whole approximated the increase in manufacturing.[1] If we assume, as seems reasonable, that the general level of productivity in non-manufacturing industry increased no more rapidly than in manufacturing, then clearly there was some pressure on prices from the wage side during this period.[2] In fact, the general *wholesale* price level of all commodities except farm products and processed foods increased by 5·2 per cent. between January, 1952 and the end of 1955. This advance may in part, of course, reflect factors other than wages.

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[1] U.S. Chamber of Commerce, *Fringe Benefits, 1953*, Washington, D.C., 1954; National Industrial Conference Board, *Computing the Cost of Fringe Benefits* (Studies in Personnel Policy, No. 128), New York, 1952.

[2] U.S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1186, *Problems in the Measurement of Expenditures on Selected Items of Supplementary Employee Remuneration*, Washington, D.C., 1956, p. v.

[3] *Ibid.*, especially tables 17 and 18, pp. 53–56.

[4] U.S. Department of Labor, Bureau of Labor Statistics, Report No. 100, *Trends in Output per Man-Hour and Man-Hours per Unit of Output—Manufacturing, 1939–53*, Washington, D.C., 1956.

[5] We know that the increase for 1952 and 1953 was somewhat below the average for the 1947-53 period (*Ibid.*, tables 4 and 5). The year 1955, however, may well have been similar to 1950, when the rate of increase was double the average. In any case, the estimates will serve for the rough use to which they are put.

That wage inflation during the 1952–55 period was comparatively moderate in the United States, as compared with the much greater pressure experienced in Great Britain, may be due to a number of factors. The period did include a mild recession beginning in the latter part of 1953 that served to dampen wage and price movements. Money wages in manufacturing, in fact, increased by an average of 6·1 per cent. in 1952, 3·5 per cent. in 1953, 2·2 per cent. in 1954, and by 5·4 per cent. in 1955.[3] A second factor is that even in a year of exceptional economic activity such as 1955, transitional unemployment proved large enough to prevent serious production bottlenecks from developing from the manpower side. Unemployment of 3 per cent. of the labour force (if not chronic) would seem clearly compatible with full employment. Third, the rate of growth in man-hour output in the American economy is sufficiently great to permit non-inflationary wage increases that approach in size the expectations that workers have formed of the wage adjustments they should receive. Three per cent. of the present average wage rate in manufacturing is close to 6 cents an hour.

A word is due on the comparative stability exhibited by the B.L.S. consumer price index since the beginning of 1952. The index was 1·6 points (1·4 per cent.) higher at the end of the period than at the beginning, and the difference between the lowest and highest months during the four-year period was only three points. Any tendency for the index to advance significantly due to higher efficiency wages was largely dampened by the decline in farm prices, which affected directly two of the major components (food and apparel) of the index. Over the period with which we are dealing, the level of food prices to consumers declined by 4·8 per cent. and apparel prices by 2·2 per cent.

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[1] A figure of average earnings for all non-manufacturing industries combined is not available. However, the Bureau of Labor Statistics publishes average hourly and weekly earnings or weekly earnings alone for a comprehensive group of such industries with an aggregate of more than 19 million employees in December, 1955. Using December, 1955 employment weights, the author computed the percentage change in average hourly earnings (or weekly earnings where this measure alone was available) for this group of industries. Over the four-year period the change for individual industries varied substantially, but the average for all industries combined fell almost exactly at the average increase of 17·7 per cent. experienced in manufacturing.

[2] It has been estimated that real private product per man-hour increased at an average rate of 3·4 per cent. annually during 1947–53 in the entire non-farm sector of the economy. See Joint Committee on the Economic Report, *Potential Economic Growth of the United States During the Next Decade*, Washington, D.C., 1954.

[3] Increases (average hourly earnings) measured from January to January beginning with January, 1952.

IV

Against this general background, the principal tendencies in the collective bargaining experience of the past decade can now be examined briefly.

1. As the earlier discussion of collective bargaining arrangements in the United States should have suggested, and as the account of average changes in wages tends to conceal, the terms of wage settlements during the post-war period exhibited very considerable diversity. This was true not only among industries, but also, very often, among companies in the same industry.[1] Uniformity of settlement tended to be greater in the years of inflation than in the periods of general price stability or of mild recession. Even unions strongly geared to " pattern bargaining "[2] tended to tailor settlements to fit the circumstances of individual firms. For example, a careful study of contracts negotiated by the United Steelworkers over the period 1946–50 indicates that settlements were practically uniform among the basic steel companies (which prior to unionisation observed essentially a follow-the-leader wage policy), but differed substantially among steel fabricating firms under contract to the union.[3]

A summary of more than 1,000 major collective bargaining settlements during the first nine months of 1955 shows wage changes ranging from zero (in 61 settlements) to 17 cents or more (in 19 settlements) an hour, with numerous but non-uniform changes in supplementary benefits. One wage decrease was reported.[4] Settlements in the unionised construction industry, not included in the above figures, were similarly diverse.[5]

2. This period saw experimentation with long-term collective bargaining contracts. These contracts assumed a variety of forms. The 1948 agreement between the General Motors Corporation and the United Automobile Workers, re-negotiated for five years in 1950, has

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[1] The terms of wage settlements among major companies and employer groups are reported in *Current Wage Developments*, issued monthly by the Bureau of Labor Statistics.

[2] " Pattern bargaining " refers generally to the practice of applying the terms of settlement reached with a major company to other companies in the same or related industry.

[3] George Seltzer, " Pattern Bargaining and the United Steelworkers ", *Journal of Political Economy*, August, 1951, pp. 319-331.

[4] *Current Wage Developments*, No. 95, November, 1955, p. v.

[5] *Ibid.*, p. vi.

received much attention. The principal features of this contract were a cost-of-living escalator clause and a provision for " annual improvement factor " wage increases. An assured increase in real wages was in effect provided for the duration of the contract, with the amount of the increase corresponding broadly to the estimated average annual increase in man-hour output in the economy as a whole. This type of contract was confined largely to the basic automobile industry and to companies in related industries under contract to the U.A.W. Other forms of contracts extending over periods of two or more years appeared in a variety of other industries.

Thus far the long-term contract affects no more than a distinct minority of the workers under collective bargaining agreements.[1] Annual negotiations, or contracts permitting such negotiations, continue to be the rule. When the five-year automobile agreements were renegotiated in the spring and summer of 1955, numerous changes were made and their term was reduced to three years. The future of the long-term contract is clearly uncertain.

Collective bargaining agreements extending over a period of years and providing for wage adjustments geared to anticipated changes in national productivity have an obvious appeal, at least to economists. They should, by and large, contribute to stability in labour-management relations, and their wage provisions, with certain qualifications relating to escalation, would appear to be non-inflationary. However, such contracts undoubtedly present problems to management in many industries, and they are not, at least at present, acceptable to many unions.

3. Pronounced changes in either direction in the cost of living will plainly be taken into account in wage bargaining. The trade union movement in the United States, however, has always shown a pronounced disinclination to tie wages automatically to a price index. After June, 1950, nevertheless, there was a sharp growth in escalator provisions in union agreements.[2] This development was primarily a response to actual and anticipated price inflation arising out of the Korean emergency. A substantial number of provisions were patterned after the General Motors agreement, described above, whereby escalation was coupled with " annual improvement factor " wage increases. By the summer of 1952 approximately 3·5 million workers were covered by contracts containing some type of escalator clause. The contracts relating to more than half of these workers did not contain provision for " improvement factor " increases.

Since the summer of 1952 the importance of escalator arrangements has declined, and by January, 1955 their coverage extended to only about 1·7 million organised workers.[1] Probably the decisive factor in reducing interest in escalation was the substantial stability achieved in the level of consumer prices beginning in 1952. The future of escalator provisions in union contracts in the United States appears to depend very largely upon the fate of the type of contract in which escalation is coupled with provision for periodic wage increases.

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[1] A U.S. Department of Labor press release dated January 4th, 1956, states that at least 2·75 million workers are covered by long-term labour-management contracts that specify the size of the wage increase they will receive in 1956.

[2] H. M. Douty, " The Growth, Status, and Implications of Wage Escalation ", *Monthly Labor Review*, February, 1953, pp. 126–129.

4. An important but complicated aspect of wage determination deserves brief, even though inadequate, treatment. The detailed wage studies of the Bureau of Labor Statistics have revealed a decline in relative wage differentials among jobs of varying skill over a considerable period of time.[2] There are unquestionably long-run forces in the labour market calculated to produce compression in job differentials. The decline in differentials during the past 10 or fifteen years, however, appears much sharper than one would have anticipated on the basis of long-run labour market forces alone.[3] The explanation, at least in part, is found in the tendency of unions in predominantly inflationary periods to formulate their wage demands in terms of uniform money increases, thus giving larger relative increases to the lower-paid workers. This tendency was supported by government wage policy during the war period.

In the past several years the tendency for job differentials to narrow has been arrested if not reversed. One indication is the number of special wage increases for skilled workers granted by major companies in a variety of industries. Additional evidence is the fact that in 1953–54, for the first time since 1945, the percentage wage increase for labourers in the important machinery manufacturing industries fell below the increase for representative skilled jobs.[4] An analysis of occupational wage movements in important labour markets for the period 1952–55 seems also to suggest that relative differentials for skilled workers are being widely maintained and, in some areas, increased.[5] The fact that the " annual improvement factor " increases in the 1955 automobile contracts are stated in percentage rather than, as in previous contracts, in cents-per-hour terms would appear to be significant in this connection.

Assuming the maintenance of reasonable economic stability, it is probable that the question of appropriate job differentials will receive increasing attention from both unions and employers in the United States. Some union-employer groups, notably in basic steel, have already done outstanding work in this area.[1]

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[1] Lily Mary David and Donald L. Helm, " Wage Escalation—Recent Developments ", *Monthly Labor Review*, March, 1955, pp. 315–318.

[2] For some of the evidence see: Harry Ober, " Occupational Wage Differentials, 1907–1947 ", *Monthly Labor Review*, August, 1948, pp. 127-134; Toivo P. Kanninen, " Occupational Wage Relationships in Manufacturing, 1952-53 ", *Monthly Labor Review*, November, 1953, pp. 1171–1178; H. M. Douty, " Union Impact on Wage Structures ", *Annual Proceedings*, Industrial Relations Research Association, 1953, pp. 61–76.

[3] A suggestive analysis of the wage differential problem may be found in M. W. Reder, " The Theory of Occupational Wage Differentials ", *American Economic Review*, December, 1955, pp. 833–852.

[4] U.S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1160, *Wages and Related Benefits in the Machinery Industries*, Washington, D.C., 1954, p. 4.

[5] A. N. Jarrell, " Area Wage Trends for Selected Occupational Groups, 1952–55 ", *Monthly Labor Review*, November, 1955, pp. 1248–1252.

5. Perhaps the most remarkable collective bargaining development in the post-war period is found in the astonishing growth of private pension and of health and insurance plans financed wholly or in part by employers. Such plans for wage earners were not unknown before the war. But in the post-war period these types of benefits were brought within the orbit of collective bargaining. Worker coverage and types and amounts of benefits were greatly extended. A recent study by the Bureau of Labor Statistics indicates that the number of workers covered by some type of collectively bargained health, insurance, or pension plan increased more than twentyfold between 1945 and 1954.[2] In the latter year more than 11 million workers, excluding government and railroad employees, were provided with one or more benefits under such plans by union-management agreement.

This development represents a significant extension of the area of collective bargaining. It reflects, of course, an effort by unions to increase the protection of workers against loss of income from a range of hazards. Negotiated pension plans are designed to supplement the benefits to which workers are entitled under the Federal old-age and survivors' insurance system.[3] The benefits provided by health and insurance plans vary according to the particular plan. They are frequently comprehensive in scope, including life, accidental death and dismemberment, and sickness insurance, hospitalisation, surgical, and medical care benefits.[4] The great growth of group medical plans, whether under collective bargaining or independently of it, represents at present the dominant approach in the United States to the problem that is sought to be met through the National Health Service in Great Britain.

The establishment of these employee benefit plans under collective bargaining has raised many new problems for both management and labour. It has also created problems of public policy which will require careful consideration in the years ahead.[5]

6. Finally, reference must be made to a new development in collective bargaining that may have considerable significance. After

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[1] Joe Goin, " Job Evaluation in the United States Steel Industry ", *Bulletin*, International Metalworkers' Federation, March, 1953.

[2] Evan Keith Rowe, " Health, Insurance, and Pension Plans in Union Contracts ", *Monthly Labor Review*, September, 1955, pp. 993–1,000.

[3] For a summary of the provisions of a significant number of collectively bargained pension plans, and for an analysis of some of the problems associated with this development, see U.S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1147, *Pension Plans Under Collective Bargaining*, Washington, D.C., 1954.

[4] U.S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1180, *Digest of One Hundred Selected Health and Insurance Plans Under Collective Bargaining, 1954*, Washington, D.C., 1955.

[5] Extensive hearings on the administration of health and welfare plans have been held recently by a sub-committee of the U.S. Senate Committee on Labor and Education.

many years of intensive discussion and very little experimentation, the idea of a guaranteed annual wage was suddenly transformed into supplemental unemployment insurance. This occurred in mid-1955, when the United Automobile Workers' Union accepted a counter-proposal by the Ford Motor Company to its demand for a guaranteed wage. The Ford plan, in brief, provides for: (*a*) company payments into a fund of 5 cents for each man-hour paid for beginning June 6th, 1955; (*b*) the accumulation of individual worker "credits" at a rate related to seniority; and (*c*) the payment to laid-off workers of benefits supplemental to unemployment insurance on or after June 1st, 1956, provided certain contingencies are met. The benefits are payable for a maximum of 26 weeks at one time. When combined with State unemployment insurance, these benefits will give the employee a maximum of 65 per cent. of his weekly straight-time pay (after taxes) for a 40-hour week for the first four consecutive weeks of benefits, and a maximum of 60 per cent. thereafter for a period up to 22 more weeks.[1]

By the beginning of 1956, supplemental unemployment benefit plans had been incorporated in agreements covering more than a million workers, largely in the automobile, automotive parts, and farm equipment industries. Most of the plans thus far have followed the Ford pattern. A new type of plan, however, has been negotiated by the Glass Workers' Union and leading companies in the glass industry. Under this plan, company contributions of 5 cents a man-hour are used to build an individual fund for each employee, regardless of seniority. An employee can draw against the fund accumulated in his name in the event of either layoff or protracted illness. Under this plan there is no pooling of funds or any relation between withdrawals and State unemployment insurance payments. It seems clear that layoff benefits, in one form or another, will be an issue in collective bargaining for some time to come.

Bureau of Labor Statistics,
U.S. Department of Labor.

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[1] "The 1955 Ford and General Motors Union Contracts", *Monthly Labor Review*, August, 1955. The provisions of the layoff plan are quite complicated and for details reference should be had to the text of the plan (Exhibit C of the Ford Motor Company—U.A.W. Agreement dated June 8th, 1955).

Seamen's Sixpences: An Index of Commercial Activity, 1697–1828

By Ralph Davis

I

The establishment of Greenwich Hospital for disabled seamen in 1695 was an act of royal bounty. But once established, its further maintenance was a charge to be borne by seamen themselves. The *Act for the increase and Incouragement of Seamen* of 1696[1] provided that " Every Seaman whatsoever, that shall serve His Majesty, His Heirs or Successors, or any other Person or Persons whatsoever, in any of His Majesty's Ships, or in any Ship or Vessel whatsoever, belonging or to belong to any the Subjects of England, or any other His Majesty's Dominions, shall allow, and there shall be paid out of the Wages of every such Seaman to grow due for such his Service, Sixpence per Mensem ". A Receiver-General of the Sixpences from Merchant Seamen was appointed, with subordinate officials; separate collections, which do not concern us here, were made from naval seamen. The sixpence per month from merchant seamen was collected for one hundred and thirty-eight years, being finally abolished as from the end of 1834.[2]

Summaries of the amounts collected survive for nearly the whole of this long period, in the accounts of the Receiver-General from 1707–13 and from 1717–1828.[3] Good estimates can be made, for most of the early missing years, from the accounts of the Treasurer of Greenwich Hospital, which record the amounts paid over to him.[4] The Receiver-General's accounts for the whole period show London and outport receipts separately; in addition, from 1735 onward the receipts at each separate outport of England and Wales are usually recorded, and after 1804 similar details are given for the ports of Scotland and Ireland.[5]

These accounts constitute an annual record of the employment of merchant seamen. Since every pound sterling collected represented

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[1] 7 & 8 William III, c. 21.

[2] 4 & 5 William IV, c. 34.

[3] In the Public Record Office: Adm. 68–1 for 1707–13 and 1717–32; Adm. 69–89 *et seq.* for the annual accounts from 1733 onward.

[4] Adm. 69–1 contains figures of the Treasurer's total receipt for each of the periods December 23rd, 1696, to December 22nd, 1697, and February 9th, 1698, to August 10th, 1703. The collation of various of his financial statements provides annual figures of his receipts for each of the years 1704–06 (Adm. 69–1 and BM Add. MSS. 38464, p. 16) and 1714–16 (Adm. 68–1 and Adm. 69–1). The Receiver-General's expenses, which make up the difference between his receipts and the amounts he paid to the Treasurer, were very stable at around £1,000 p.a.

[5] The separate outport records are complete for every year from 1771 onward, except 1813. There is an isolated account of collections from each outport, for the year 1712, in Adm. 68–1.

(subject to modifications considered below) the employment of forty seamen for a month, then in 1730, for example, the £7,333 15s. 5d. collected indicates that 293,351 seaman-months had been worked (subject to the same modifications); i.e. the full-time labour for a year of 24,448 seamen. This includes seamen in coasting trade and in long-distance fisheries, as well as those engaged in foreign trade.

There was much legislation to modify the original provision for the collection of seamen's sixpences. The first receivers found their powers of enforcement inadequate; the journal of the Commissioners to whom they were responsible[1] notes on December 31st, 1697, that "Their Lordships [of the Admiralty] had observed that ye Returne from ye Outports of ye 6d was very Short of what was expected"; and on May 11th, 1698, that the Admiralty had at last agreed to sterner measures against non-payers. Acts of 1697[2] and 1712[3] plugged up some loopholes; the latter measure, which was particularly important, recognised that the struggle to collect from inshore fishermen and small-boatmen was hopeless, and exempted them, along with the crews of hoys in the Thames estuary and pauper apprentices under 18.[4] From this act of 1712 dates, it seems, a rather more efficient collection of the sixpences.

The next important measure, in 1730[5] pointed out that, since no provision had previously been made for the appointment of collectors for the Channel Isles or the American plantations, there had been no collections in those places, although the general intention of the acts was clearly to include them. This deficiency was remedied, and monies from the Channel Isles and America appear in the accounts from 1731 onward. Because of their omission before 1731, and because the Channel Isles are insignificant[6] and American shipping is really irrelevant to the consideration of British commercial activity, these figures have been omitted from the totals presented here.[7] This act remedied some further deficiencies which had become apparent in the powers of the collectors; another, in 1746[8] provided that privateers' crews were not to be exempt from payment.

A new consolidating act in 1747[9] brought in some important administrative changes, applying only to England and Wales. The Society of Merchant Venturers at Bristol, the Corporation of Trinity House at Hull, and *ad hoc* committees which could be set up if desired at other outports, were to supervise the collection and the local application

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[1] Adm. 105–41.

[2] 8 & 9 William III, c. 23.

[3] 10 Anne, c. 17.

[4] Letters on the difficulties of collection before 1712, and proposed remedies, most of which were incorporated in this act, will be found in Adm. 1–3997.

[5] 2 Geo. II, c. 7.

[6] Moreover, they are treated as foreign places in the trade statistics.

[7] The American figures are briefly discussed in C. M. Andrews, *Guide to the Materials for American History in the Public Record Office of Great Britain* (Washington, 1912–14), II, 60–63.

[8] 18 Geo. II, c. 31.

[9] 20 Geo. II, c. 38. Until this act was passed, merchant seamen, although contributing to the funds, received no appreciable benefits from Greenwich Hospital.

(in out-pensions, etc.) of the sixpences and certain forfeitures which had come to be collected with them. The forfeitures were negligible in amount. If the local payments of pensions were substantial, a sharp drop should appear in the Receiver-General's receipt from the outports, at least from Bristol and Hull. In fact, no effects can be observed in the figures.

This same act had another apparently important provision; it exempted seamen in the East India Company's service from payment of the sixpences.[1] This should have made a considerable difference to the London and therefore to the national totals. But in fact the collections from East Indiamen continued; they appear regularly in the 1750's and 1760's in the detailed record of the London collections which has been preserved.[2]

It may be concluded from this series of acts that before 1712 the outport figures at least are defective,[3] and that deficiencies, if only small ones, continued until 1730 or later.[4] The inclusion of privateers after 1746 may have inflated the wartime figures of some of the south coast ports. The new system after 1747 should have materially affected the amounts received from the outports and from the London collection. No effect is apparent; but the possibility cannot be ignored that it has been masked by a rapid growth of shipping activity after 1747.

Apart from this difficulty, which is probably, but not certainly, of small importance, what degree of reliability can be attached to the statistics?

A well informed writer on shipping in 1792 stated, "The number of seamen who paid the sixpenny duty to Greenwich Hospital in the year 1788 was 55,013. There are certainly many more who evaded the payment of the Duty."[5] He attempted to calculate the extent of this evasion, and concluded it embraced nearly a third of the seamen who were liable to pay; but the figures do not bear him out, and indeed suggest that evasion was rather small.[6]

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[1] On the ground that the Company had its own system of benefits for disabled seamen and widows.

[2] In Adm. 68.

[3] Before 1707, too, they presumably excluded Scotland.

[4] Miss E. E. Hoon. *The Organisation of the English Customs System, 1696–1786* (New York, 1938), 41, shows that difficulties were being encountered in the collection at least as late as the 1760's and 1770's.

[5] BM Add. MSS. 38432, p. 38. This is a volume of Lord Liverpool's papers. In the same volume, p. 319, is *An Account of the Number of Men employed in the Merchant Service from the Year 1716 to the Year 1777 both inclusive.* This latter document (to which Dr. A. H. John kindly drew my attention) is probably derived from the records of the Receiver of Sixpences. The numbers bear a fairly close resemblance to those which can be calculated from the figures reproduced here, and it is difficult to imagine from what other source such figures could have been drawn. The document itself gives no indication of its sources.

[6] He quotes the Registrar-General of Shipping's estimate of 112,056 seamen in 1790, which is the number of men required to man fully all British ships. Over a tenth of these were men exempt from the sixpenny duty (inshore fishermen, smallboatmen, pauper apprentices, etc.). The registered tonnage of British ships was 7 per cent. greater in 1790 than in 1788. The 1788 figure of seamen liable for duty

It is difficult to see why evasion should have been widespread. A ship could not be smuggled into port, and any customs official could roughly estimate the size of crew she would need to carry. Under an act of 1730[1] each ship had to carry a muster roll bearing the names and agreed wages of all the crew, and it was in the interest of each member of the crew to see that his name was on it. The characters most difficult to deal with, the inshore fishermen and the crews of open boats (which came to be interpreted as vessels under 15 tons) had been excluded by the act of 1712. Finally, the customs officials who collected the sixpences had a direct pecuniary interest, for they were paid by a commission on their remittances (except in London, where the Receiver-General himself supervised collection). Perhaps in small ports where the amount of commission to be earned was trivial, enforcement of the law was sometimes lax; but this would not seriously affect the overall totals.

Long before the end of the eighteenth century, the payment of the Greenwich Hospital sixpences had evidently come to be regarded by masters as normal and inevitable. The standard reference book which they used, Steel's *Shipmaster's Assistant* (which went through dozens of editions after its first publication in 1787) always contained tables for calculating the " Greenwich Hospital Duty ".

The point is not that sixpences give a precisely accurate record of the number of seamen or seaman-years worked, but that the surprising smallness of the totals need not be accounted for by the assumption of widespread evasion. Unless evasion was still, after the act of 1730, of real importance—and this appears very unlikely—the figures from that date at least provide a consistent series, subiect to some unknown but small overall effect from the 1747 Act.

II

On the basis of these collections, two sets of figures can be compiled. The first shows fluctuations in seamen's employment, and hence in shipping activity for the country as a whole: the second compares the fortunes of individual regions. Moreover, in combination with other statistical series, these figures throw some light on investment decisions in the industry.

Table I records the total income of the Receiver of Sixpences, from the whole of the British Isles, divided when the details are available between London, the English outports, Scotland and Ireland.

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if all ships were fully manned throughout the year was, therefore, under 93,000. But ships were not manned during their long stays in home ports between voyages; and with the long turn-round times of the period, and a common practice of winter laying-up to avoid the worst of the weather, these periods of idleness probably averaged between a quarter and a third of the year. (Involuntary laying-up for lack of cargo was not likely to be important in 1788.) So the sixpences collected should represent between 60 and 70 thousand "seaman-years". In fact they represent just on 60 thousand; the writer's figure of 55,013 is a miscalculation.

[1] 2 Geo. II, c. 36.

The Receiver-General's income was much less than the total amount collected. In each outport one of the customs officials was appointed as local Receiver of Sixpences, and another as Controller (i.e. internal auditor). These two gentlemen were remunerated by a commission, shared between them; at first this was 11¼ per cent. but it was increased at some unknown date before 1769 to 12½ per cent.[1] At Liverpool, exceptionally, the total commission was 7½ per cent.[2] All collectors had some tiny incidental expenses, never amounting to more than 1 per cent. of collections, if the accounts after 1804 are a true guide. In Scotland and Ireland there were, in addition to the port Receivers drawing their 12½ per cent. commission, salaried principal receivers, at Edinburgh (£50 per annum) and Dublin (£25 per annum) with small office expenses. The Irish receiver had in addition a fluctuating expense for the remittance of his funds.[3]

The Receiver-General was not handed the collections promptly. In the early nineteenth century his accounts to 31st December each year included receipts from most outports of the quarterly takings up to the preceding 30th September. (The smaller ports often lagged still further behind, and were irregular in their payments.) His receipts from Ireland and Scotland were for the year ended the *previous* 31st December. On the average, then, outport receipts were 4½ months behind the actual collection from ships' masters, and Irish and Scottish receipts at least 18 months behind. The London collections, on the other hand, were right up to date.

The only series which is absolutely continuous from 1707 to 1828 is that for the United Kingdom as a whole. But in its early years it is unsatisfactory, for the Scottish and Irish figures seem to be absurdly small; and throughout the century they are erratic in a way which suggests great irregularity in the payment in of amounts collected.

The most reliable of the series in Table I therefore, is probably that for England and Wales alone; it is unfortunately incomplete for the earlier part of the century.[4]

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[1] At London the Receiver-General was himself the local collector, and neither he nor his agents in the port were remunerated by commission.

[2] From November 6th, 1696, 2s. 3d. in the £ was paid to the local officers. (Adm. 105–41.) A fragment in the Receiver-General's account for 1769 shows that 12½ per cent. was being paid by that date: there is no record of when the change took place. The detailed accounts after 1804 make it clear that 12½ per cent. was the normal commission then, except at Liverpool where the rate was 7½ per cent. (Adm. 76–23.)

[3] The gross amounts collected at the ports, and the local expenses, are recorded in the Receiver-General's accounts from 1804 onward.

[4] An adjustment has been necessary to record true net collections at Liverpool and Bristol from 1799 to 1811. Under an act of 1797 (37 Geo. III, c. 73) the wages of seamen in the slave trade who deserted in the West Indies were forfeited, one third going to the Receiver-General of Sixpences for the benefit of Greenwich Hospital. These amounts were always shown separately at London; but at Liverpool and Bristol, the other two ports concerned, they were included with the sixpences until 1804. At Liverpool they were very large; in 1805, 1806 and 1807 they varied between 47 per cent. and 52 per cent. of the total net income of the local receiver. It has therefore been assumed that for the years 1799-1803 inclusive the total net collection may be halved to arrive at the net collection of sixpences; and the amount of the forfeitures in the transition year, 1798, has been guessed at £300 to make

Table II provides data on the growth of shipping employment in various regions of England and Wales, defined as follows:[1]

1. London.
2. North-west (Scottish border to Cardigan).
3. South-west (Pembroke to Land's End).
4. South (Land's End to South bank of Thames estuary).
5. East (North bank of Thames estuary to Scottish border).
6. Western coal ports (Whitehaven, Swansea, Milford, Cardiff, Llanelly).[2]
7. North-eastern coal ports (Newcastle, Sunderland, Stockton, Whitby, Blyth).

The coastal coal trade engaged so great a number of English ships and seamen that it has seemed worth while to make a rough separation of the ports which subsisted mainly by the coal trade from all others. In regions 1 to 5, seamen engaged in foreign trade make up a large majority of those employed.

The occasional sharp increases in the total for the south coast (usually in wartime) reflect not the commercial importance of its harbours but their convenience as places for emergency paying off of crews and transshipment of cargoes. Falmouth, Cowes and Plymouth in particular show huge wartime growth. At these places the press-gang was active in taking seamen off homeward bound ships; and the pressed seaman would draw his wages and have the Sixpenny Duty deducted before he left his ship.

III

In Table III, the statistics of seamen's employment are related to the figures of English-owned shipping tonnage from 1788, to produce an index of changes in the degree to which that tonnage was utilised. In other words:

$$\begin{array}{c}\text{Degree of Utilisation}\\ \text{of Shipping tonnage}\end{array} = \frac{\text{Seamen employed}}{\text{Tonnage of English-owned ships}}$$

Changes in this Degree of Utilisation index are then compared with the annual figures of ships built. This latter comparison reveals the

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possible the inclusion of a national total for that year; a gap has been left in the North-west region series for the year. At Bristol the amounts involved were very small, and a deduction of 5 per cent. from the net collection, each year from 1799 to 1803, seems adequate. The recorded figures have been used from 1804 onward; this item gradually disappeared, of course, after the abolition of the slave trade.

[1] Space does not permit the listing of figures for individual ports. The growth of the north-west region reflects, of course, the rise of Liverpool; the relative stagnation of the south-west tells the story of Bristol. The other regions have no such dominant ports.

[2] At the beginning of the 18th century, west coast coal exports were largely from Whitehaven; but by the 1790's Whitehaven was in decline, and the rapid expansion of the total for the region reflects the growth of the South Wales coal trade.

connection between the degree of utilisation of ships (i.e. of the capital already invested in the shipping industry) and the investment of new capital in the industry.

Certain difficulties arise from the shortcomings of the statistics.[1] Registration was made compulsory for all ships over 15 tons in 1787,[2] and subsequent records are of ships registered under this act and the amending act of 1826.[3] Ships were often included in the registry totals long after they had been broken up, and the figures therefore overstate, to an extent which increases year by year, the tonnage of English-owned ships. This misrecording was ended by the introduction of a new registration system after 1827; its extent is revealed by the drop of 13 per cent. in the total tonnage on the register, in the year when the new system was put into force.[4]

The fraction $\frac{\text{Seamen employed}}{\text{Tonnage of English-owned ships}}$ which is calculated in Table III[5] seems to indicate a secular decline in the degree of utilisation of ships. This secular decline is illusory; partly because of the deficiencies of the register of shipping. But intermingled with the error due to these deficiencies is another factor of the first importance. During the eighteenth century the size of ships crews really was declining, very substantially, in relation to the tonnage of ships.[6] Because of the mingling, in the statistics, of errors of record with this real change in conditions, the long-term change in the degree of utilisation as calculated here has little significance.

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[1] Statistics of English-owned shipping exist for each year from 1751. (From 1751 in BM Add. MSS. 11255; printed from 1760 in D. MacPherson, *Annals of Commerce*). Customs officers in each port noted the tonnage of all ships entering, and used their lists as a basis for estimating the total English-owned tonnage. A ship which did not enter an English port during the year—because it lay idle, or because it spent a whole year abroad—did not enter into their calculations. In war years, therefore, the ownership totals show a sharp fall, simply because many English-owned ships were laid up for long periods. There are other defects in these statistics; and since there are no shipbuilding figures for comparison, before 1787, it has seemed best to use only the registration figures, from 1788 onwards.

[2] 26 George III, c. 60.

[3] The amending act is 6 Geo. IV, c. 110. The figures from 1788 to 1800 are printed in D. MacPherson, *op. cit.*, and from 1803 onward in J. Marshall, *A Digest of All the Accounts . . . of the United Kingdom* (1833). Figures for 1801 and 1802 have been obtained from the original returns in the Public Record Office (Customs 17).

[4] See the comment in G. R. Porter, *The Progress of the Nation* (1st edition, 1847, p. 402). Because of the change, the figures for 1827 and 1828 are not comparable with those for earlier years.

[5] In making this calculation, the index number of seamen's employment in each year (1789 = 100) has been divided by the tonnage of English-owned shipping recorded the *previous* year, since this record is at 30th September, and the following year's employment is obviously more relevant to it. The base year for tonnage is therefore 1788.

[6] This is too large a subject to be dealt with here. The fact can be confirmed by comparing any extensive bodies of statistics illustrating the manning of merchant ships at different periods; e.g. registers of passes issued by the Admiralty (PRO Adm. 7); lists of ships and crews in *Acts of the Privy Council* (*Colonial*); Lloyds Registers of the late 18th century; D. MacPherson, *op. cit.*

The cyclical changes, on the other hand, are of great interest, particularly when compared with short-term changes in shipbuilding activity.[1] To bring out the cyclical variation more clearly, the secular trend in utilisation and shipbuilding has been eliminated by the method of least squares, and the actual figures for each year have been expressed as percentages of the line of trend. The chart shows the cyclical movements of the two series, expressed in this way.

As might be expected, utilisation and new shipbuilding are shown to move closely together, subject to (*a*) a much more violent swing of investment (shipbuilding) than utilisation, and (*b*) a clear tendency for the peaks and troughs of shipbuilding to lag behind those of utilisation.[2]

Messrs. Gayer, Schwartz & Rostow have observed this time-lag of the shipbuilding series (as also of Shannon's brick index, another investment indicator) against the mass of cyclical data they have compiled.[3] Their explanation, so far as shipbuilding is concerned, is in the time taken to build ships—the time between the decision to invest and the recording of the new ship in the register. It may be doubted whether this is a full explanation, and a closer consideration of the time-lag between the two series now under discussion may throw more light on the matter.

The precise time-lag which is significant for the economist is that between certain levels of economic activity and the relevant responses of entrepreneurs. How far are the dates in our series *accurate* guides to the " delay in response " on the part of the shipowner who made investment decisions ?

For a given year, the degree of utilisation is the relation between the sums paid in to the Receiver-General of Sixpences between 1st January and 31st December, and the registered tonnage of shipping at a single date, viz. 30th September of the *previous* year. It has been pointed out[4] that the former figure represents collections made in the English outports, from ships' masters, about 4½ months earlier; taking London into account the collection is on average about 3½ months before its recording. Moreover, the figures represent the state of mercantile activity, not at the date of collection, but at the date when decisions were made to employ ships and seamen. This might be a fortnight earlier in coastal trade, or eighteen months earlier for East Indiamen. The average time lies, almost certainly, between three and six months. The collections recorded for 1800, for example, reflect business activity from the spring of 1799 to the spring of 1800, and they are related to

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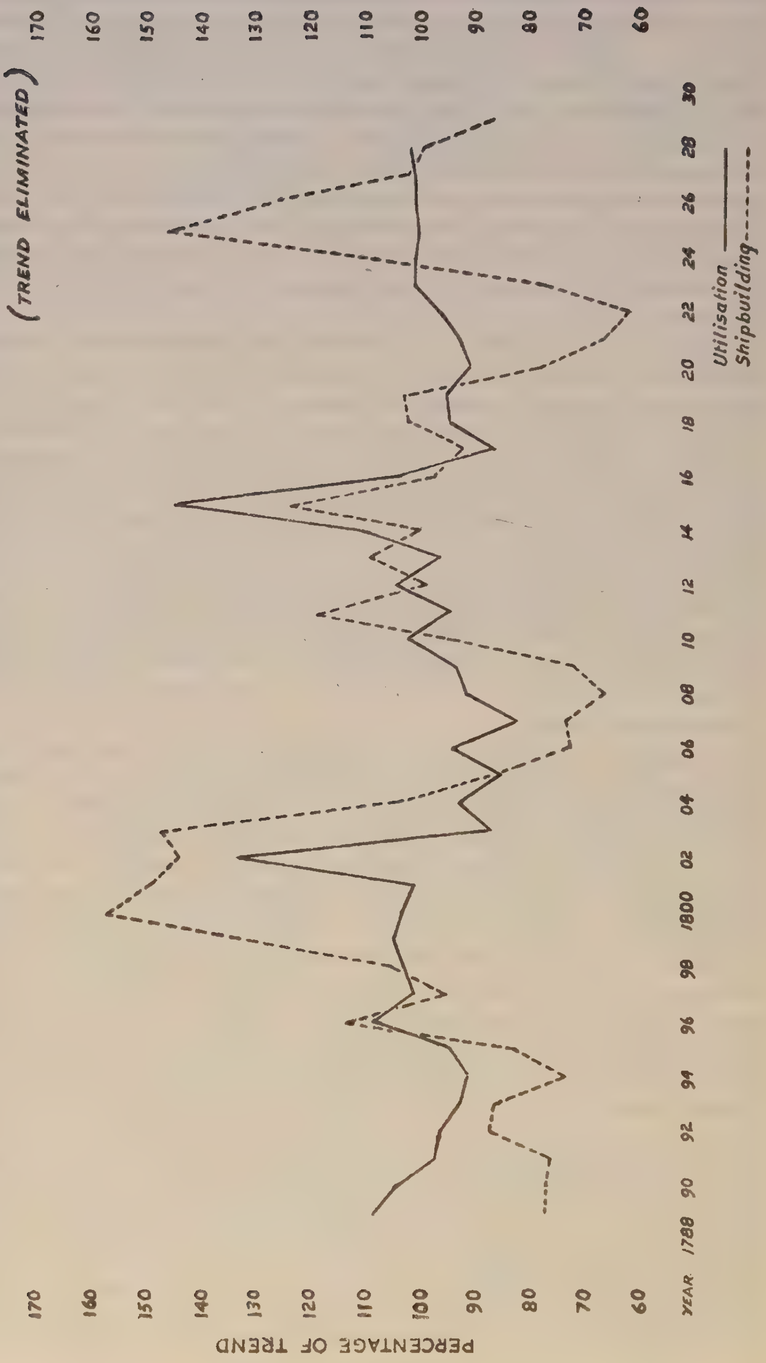
[1] Sources for shipbuilding tonnage: 1788–1794 PRO Customs 17; 1795–1814 *House of Lords Papers*, 1815, No. 91; 1815–1829 J. Marshall, *op. cit.* The base year is 1789; building in this year is compared with the relation of 1789 seamen's employment to tonnage of shipping owned at 30th September, 1788.

[2] The correlation coefficient between the two series is 0·42 without any time-lag, and 0·45 with a one-year lag.

[3] *The Growth and Fluctuation of the British Economy, 1790–1850* (Oxford, 1953), pp. 217, 695, 709.

[4] P. 332 *supra*.



COMPARISON OF THE DEGREE OF UTILISATION OF SHIPS WITH SHIPBUILDING IN ENGLISH PORTS shipping tonnage at 30th September, 1799—very near to the middle of that period.

The shipbuilding tonnage with which, in this case, the comparison is made, is that for the year ended 30th September, 1800. Almost any merchant ship of the period could be built in under six months,[1] and since shipbuilding was heavily concentrated on the summer months (with completion and registration in the late summer or autumn) the relevant decisions were, on the whole, those made during the winter of 1799–1800.[2] Thus in Table III, again taking the year 1800 as an example, the degree of utilisation from spring 1799 to spring 1800 is compared with investment decisions made, on the whole, in the winter of 1799–1800. Making every allowance for the impreciseness of these calculations, it is clear that the time-lag is if anything longer rather than shorter than that suggested by the original data.

The time-lag is, then, a genuine lag in decision-making, and not to be explained away as the time taken in shipbuilding. But this is surely not unreasonable. In any particular industry, the change in activity or profitability need not be *instantaneously* followed by change in the character of investment decisions: the entrepreneur wants to be tolerably sure that a change has really occurred before he bases important action on it. When the production of investment goods has itself become a very high proportion of total business activity, then the time-lag of investment indices behind an index of general activity may disappear or become negligible. But this condition had not been achieved in the opening decades of the nineteenth century, and Messrs. Gayer, Schwartz & Rostow do not need to seek special explanations for the time-lag of their two good investment indices, shipbuilding and brick production.[3]

These calculations, in all their crudity, have seemed worth making because of the uniqueness of the statistics on which they are based. The collections of the Receiver-General of Sixpences, beginning in 1696 and recorded on a regular yearly basis from 1707, make a useful contribution to the scanty data on business activity in the early eighteenth century, and reinforce the growing body of such data up to 1828. They tend to reinforce the general conclusions on cyclical fluctuation and overall growth which other students of the period have reached. The cyclical turning-points after 1790 correspond fairly closely with those established by Mr. Rostow;[1] and Professor Ashton informs me that there is a similar correspondence at most of the major turning points during the eighteenth century. Apart from cyclical troughs, growth is continuous except during two periods; from about 1731 to 1746, when Europe and England were seriously disturbed by war; and in the years after 1816 when shipping, like other industries, was undergoing a painful readjustment to peacetime conditions.

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[1] For this reason, the discussion of the 'shipbuilding cycle' in J. Schumpeter, *Business Cycles* (New York, 1939), pp. 533–535, has little relevance to conditions before the later 19th century.

[2] There are two qualifications to this.
- (*a*) A few decisions made the previous winter will have resulted in the registration of ships just after 30th September, 1799.
- (*b*) At the peak of shipbuilding booms, the prospective shipowner may have had to wait for the building of his ship to be commenced, after he had made his decision to invest.

[3] Changes in the degree of utilisation are not, of course, complete explanations of changes in investment which soon follow them. Why, for example, is there such a huge building of ships in the 1820's, with a modest increase in utilisation? One might hazard a guess—it is no more—that this is associated with the smallness of shipbuilding in the war-end boom, possibly due to expectation of the loss of the vast wartime entrepôt trade; twenty years of inadequate replacement began to produce their effect on investors in the moderate prosperity of the mid-twenties.

These statistics provide what are believed to be the only employment record of the period, though unfortunately they cannot be related to total numbers of seamen.[2] Moreover, we have seen their value when associated with another exceptionally useful set of records from 1788—that of the Registrar-General of Shipping. The unfortunate merchant seamen of the eighteenth and early nineteenth centuries obtained few benefits from their sixpences, which went to finance a mainly naval institution; but the twentieth-century historian may feel that their little monthly sacrifices were not altogether in vain.

The University,
Hull.

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[1] W. W. Rostow, *British Economy of the Nineteenth Century* (Oxford, 1948), p. 33.

[2] The Registrar-General of Shipping recorded the total number of seamen each year after 1788; but his figure is a calculation from shipping tonnage, using estimates of the average number of seamen required to man ships of various categories of size.

TABLE I

TOTAL INCOMINGS OF THE RECEIVER OF SIXPENCES (EXCLUDING RECEIPTS FROM AMERICA AND THE CHANNEL ISLES) (£s)

	TOTAL	*Total England and Wales*	*London*	*All out-ports*	*English out-ports*	*Scotland*	*Ireland*
1707	5,481		3,929	1,552			
1708	4,795		2,949	1,846			
1709	4,730		3,470	1,260			
1710	5,632		3,488	2,144			
1711	5,150		3,586	1,563			
1712	5,311	5,242	3,750	1,562	1,492		
1713	7,251		5,020	2,231			
1714	6,928						
1715	7,219						
1716	6,887						
1717	6,761		3,927	2,833			
1718	6,967		3,989	2,977			
1719	6,721		3,874	2,847			
1720	5,956		3,644	2,312			
1721	6,160		3,655	2,505			
1722	6,629		3,673	2,956			
1723	6,571		3,925	2,647			
1724	6,442		3,877	2,565			
1725	7,116		4,333	2,782			
1726	4,801		2,727	2,074			
1727	7,205		4,086	3,119			
1728	9,321		5,724	3,597			
1729	8,417		4,494	3,923			
1730	8,411		4,327	4,080			
1731	8,590		4,108	4,482			
1732	8,292		3,770	4,522			
1733	8,230		4,377	3,953			
1734	7,603		3,432	4,171			
1735	7,956	7,134	3,843	4,113	3,291	267	555
1736	7,378	6,468	3,115	4,263	3,353	237	673
1737	7,370	6,571	3,119	4,251	3,452	180	619
1738	7,631	6,705	3,139	4,492	3,566	352	574
1739	7,479		3,281	4,198			
1740	6,346	5,625	2,505	3,841	3,120	184	537
1741	6,911	6,299	3,006	3,905	3,293	224	388
1742	6,408	5,936	2,925	3,483	3,011	208	264
1743	7,622		3,820	3,802			
1744	5,995	5,399	2,434	3,561	2,965	111	485
1745	5,599	5,123	1,963	3,636	3,160	90	386
1746	7,527	6,983	3,688	3,839	3,295	262	282
1747	5,985	5,561	2,399	3,586	3,162	154	270
1748	7,657		3,871	3,786			
1749	7,633	7,107	3,479	4,154	3,628	199	327
1750	7,868		3,647	4,221			
1751	8,308	7,329	3,432	4,876	3,897	319	660
1752	8,092	7,021	3,110	4,982	3,911	378	693
1753	8,113		2,902	5,211			
1754	8,367	7,210	3,369	4,998	3,841	375	782
1755	9,260	8,178	3,847	5,413	4,331	373	709
1756	7,662		2,643	5,019			
1757	7,615		3,007	4,608			
1758	6,896		2,779	4,117			
1759	9,165	8,396	4,366	4,799	4,030	235	534
1760	9,015	8,386	4,362	4,653	4,024	257	372
1761	9,184		4,363	4,821			
1762	8,566		4,036	4,530			
1763	11,753	10,701	6,402	5,351	4,299	504	548
1764	9,675	8,435	4,045	5,630	4,390	559	681
1765	9,347	8,320	3,840	5,507	4,480	417	610
1766	11,040	9,778	4,611	6,429	5,167	603	659

TABLE I (*continued*)

	TOTAL	*Total England and Wales*	*London*	*All out-ports*	*English out-ports*	*Scotland*	*Ireland*
1767	10,422	9,185	4,105	6,317	5,080	557	680
1768	9,334	8,161	3,559	5,775	4,602	500	673
1769	10,292	8,537	3,861	6,431	4,676	1,019	736
1770	10,454		3,938	6,516			
1771	10,518	8,878	3,894	6,624	4,984	844	796
1772	11,020	9,337	4,185	6,835	5,152	906	777
1773	10,612	9,009	4,126	6,486	4,883	839	764
1774	10,950	8,634	3,365	7,585	5,269	1,336	980
1775	10,765	9,263	3,715	7,050	5,548	837	665
1776	9,909	8,481	3,254	6,655	5,227	387	1,041
1777	10,550	8,798	4,090	6,460	4,708	1,118	634
1778	11,017	9,548	4,513	6,504	5,035	827	642
1779	9,662	8,346	3,876	5,786	4,470	718	598
1780	11,680	10,376	5,195	6,495	5,181	700	614
1781	10,657	9,479	4,796	5,861	4,683	664	514
1782	12,370	11,328	6,054	6,316	5,274	601	441
1783	10,785	9,658	4,962	5,823	4,696	670	457
1784	12,248	11,083	6,267	5,981	4,816	599	566
1785	12,294	11,115	5,113	7,181	6,002	762	417
1786	11,888	9,980	4,504	7,384	5,476	1,053	855
1787	11,920	10,438	4,665	7,255	5,773	984	498
1788	12,865	11,135	4,832	8,033	6,303	861	869
1789	13,466	11,191	4,841	8,625	6,350	1,368	907
1790	12,765	10,958	4,447	8,318	6,511	1,052	755
1791	12,585	10,663	4,402	8,183	6,261	1,100	822
1792	12,588	10,803	3,992	8,596	6,811	1,022	763
1793	12,151	10,491	4,013	8,138	6,478	835	825
1794	12,202	10,527	4,079	8,123	6,448	919	756
1795	12,458	10,940	5,176	7,282	5,764	880	638
1796	14,013	12,395	6,561	7,452	5,834	721	897
1797	12,296	10,884	5,326	6,970	5,558	783	629
1798	13,353	12,091	6,445	6,908	5,646	851	411
1799	14,209	12,588	6,708	7,501	5,880	895	726
1800	14,336	12,878	6,144	8,192	6,734	886	572
1801	15,372	13,746	7,153	8,219	6,593	1,217	409
1802	20,854	18,968	12,373	8,481	6,595	1,269	617
1803	15,132	13,035	6,613	8,519	6,422	1,197	900
1804	16,196	14,449	7,250	8,946	7,199	977	770
1805	15,718	13,891	6,938	8,780	6,953	1,083	744
1806	17,220	15,324	8,245	8,975	7,079	1,217	679
1807	15,162	13,187	5,844	9,318	7,343	1,475	500
1808	16,461	14,780	7,329	9,132	7,451	865	816
1809	17,566	15,284	8,095	9,471	7,189	1,590	692
1810	18,789	17,016	8,844	9,945	8,172	1,272	501
1811	18,240	16,004	8,237	10,003	7,767		
1812	20,010	17,849	10,015	9,995	7,834	1,272	889
1813	19,461		8,521	10,940			
1814	22,436	19,380	11,325	11,111	8,055	2,090	966
1815	29,116	26,230	17,853	11,263	8,377	1,920	966
1816	22,160	19,147	10,437	11,723	8,710	2,013	1,000
1817	18,802	15,943	7,334	11,468	8,609	1,591	1,268
1818	19,898	16,734	7,549	12,349	9,185	2,206	958
1819	20,183	16,842	7,018	13,165	9,824	2,288	1,053
1820	19,300	15,874	6,799	12,501	9,075	2,124	1,302
1821	19,438	15,971	6,602	12,836	9,369	2,177	1,290
1822	19,266	15,812	6,344	12,922	9,468	2,130	1,324
1823	19,528	16,323	6,710	12,818	9,613	2,010	1,195
1824	19,246	16,266	6,139	13,107	10,127	1,866	1,114
1825	19,477	16,410	6,265	13,212	10,145	1,938	1,129
1826	20,446	16,271	6,288	14,158	9,983	2,732	1,443
1827	19,681	16,472	6,442	13,239	10,030	2,011	1,198
1828	20,378	16,775	6,787	13,591	9,988	2,253	1,350

TABLE II

REGIONAL ANALYSIS OF SEAMEN'S SIXPENCES, 1735–1828 (£s)

	London	North-west	South-west	South	East	COAL	
						West	North-east
1735	3,843	381	659	608	594	87	962
1736	3,115	391	668	834	342	185	933
1737	3,119	459	749	822	446	163	813
1738	3,139	451	693	858	424	154	986
1740	2,505	257	630	615	398	73	1,147
1741	3,006	514	597	637	427	276	842
1742	2,925	598	552	462	384	198	817
1744	2,434	288	539	620	313	267	944
1745	1,963	587	557	565	274	159	1,018
1746	3,688	681	464	562	361	227	1,000
1747	2,399	470	545	589	472	161	925
1749	3,478	711	720	551	473	185	988
1751	3,432	659	624	763	626	92	1,133
1752	3,110	610	653	635	633	230	1,150
1754	3,369	813	717	602	496	136	1,077
1755	3,847	817	657	920	751	192	944
1759	4,366	879	771	708	492	128	1,052
1760	4,362	974	647	761	477	169	996
1763	6,402	986	605	999	487	155	1,067
1764	4,045	874	570	987	628	249	1,082
1765	3,840	991	639	907	612	102	1,229
1766	4,611	1,018	619	1,664	565	215	1,086
1767	4,105	1,149	658	1,057	806	318	1,092
1768	3,559	973	645	940	620	234	1,190
1769	3,861	1,125	637	953	546	293	1,122
1771	3,894	1,125	550	1,005	674	324	1,306
1772	4,185	1,189	620	1,027	706	266	1,344
1773	4,126	1,168	542	1,072	673	188	1,240
1774	3,365	1,270	694	1,073	760	294	1,178
1775	3,715	1,269	785	1,136	827	255	1,276
1776	3,254	1,362	566	880	784	282	1,353
1777	4,090	1,060	419	895	770	281	1,283
1778	4,513	1,157	487	1,035	730	293	1,333
1779	3,876	1,000	403	788	669	284	1,326
1780	5,195	1,173	564	1,220	642	296	1,286
1781	4,796	1,136	411	902	562	293	1,379
1782	6,054	1,208	732	1,116	618	238	1,362
1783	4,962	1,132	542	825	596	328	1,273
1784	6,267	1,205	546	721	670	229	1,445
1785	5,113	1,593	483	1,250	847	287	1,542
1786	4,504	1,338	591	967	789	257	1,534
1787	4,665	1,364	561	1,063	867	249	1,669
1788	4,832	1,576	580	1,052	1,049	259	1,787
1789	4,841	1,451	719	1,116	1,023	240	1,814
1790	4,447	1,677	680	1,000	1,095	218	1,833
1791	4,402	1,741	729	962	929	160	1,740
1792	3,992	1,813	719	976	1,035	327	1,941
1793	4,013	1,509	888	940	982	303	1,853
1794	4,079	1,786	692	1,182	796	257	1,735
1795	5,176	1,468	460	975	872	175	1,814
1796	6,561	1,367	487	1,173	934	199	1,674
1797	5,326	1,562	451	920	775	210	1,640
1798	6,445		480	879	968	140	1,528
1799	6,708	1,915	442	875	843	127	1,678
1800	6,144	2,124	494	1,138	859	164	1,955
1801	7,153	1,958	645	1,029	964	194	1,803
1802	12,373	1,688	546	974	1,447	289	1,651

TABLE II (*continued*)

						COAL	
	London	*North-west*	*South-west*	*South*	*East*	*West*	*North-east*
1803	6,613	1,309	490	904	1,235	465	2,019
1804	7,250	1,832	609	1,050	1,117	422	2,169
1805	6,938	1,944	541	1,060	1,173	342	1,893
1806	8,245	1,879	586	1,225	1,157	376	1,856
1807	5,844	1,957	801	1,265	1,145	422	1,753
1808	7,329	1,687	668	1,644	978	452	2,020
1809	8,095	1,803	695	1,423	986	368	1,914
1810	8,844	2,025	758	1,530	1,191	464	2,204
1811	8,237	1,595	714	1,491	1,212	619	2,128
1812	10,015	1,530	697	1,451	1,316	655	2,185
1814	11,325	1,876	665	1,485	1,322	691	2,016
1815	17,853	1,800	642	1,540	1,648	610	2,137
1816	10,437	2,046	655	1,322	1,509	625	2,553
1817	7,334	2,037	599	1,332	1,415	605	2,621
1818	7,549	2,309	731	1,491	1,547	569	2,538
1819	7,018	2,495	761	1,626	1,773	678	2,491
1820	6,799	2,181	715	1,449	1,413	689	2,628
1821	6,602	2,236	726	1,483	1,606	657	2,661
1822	6,344	2,425	747	1,500	1,567	682	2,547
1823	6,710	2,542	746	1,436	1,531	640	2,718
1824	6,139	2,877	804	1,509	1,585	727	2,625
1825	6,265	2,747	809	1,487	1,606	860	2,636
1826	6,288	2,354	729	1,528	1,383	1,119	2,870
1827	6,442	2,511	830	1,586	1,520	942	2,641
1828	6,787	2,585	908	1,641	1,469	699	2,686

TABLE III

DEGREE OF UTILISATION OF SHIPPING, AND NEW INVESTMENT IN SHIPS

	(*a*) *Seamen's employment during year* (*sixpences*)	(*b*) *Tonnage of ships at 30th September* (000 *tons*)	(*c*) *Tonnage built during year* (000 *tons*)	*Index Numbers*					
				(*a*) (*base* 1789)	(*b*) (*base* 1788)	(*c*) (*base* 1789)	*a*/*b*	*Trend eliminated* *a*/*b*	*c*
	£								
1787			78			159·2			123·2
1788	11,135	1,055	61	99·5	100·0	124·5			96·2
1789	11,191	1,078	49	100·0	102·2	100·0	100·0	108·8	77·1
1790	10,958	1,135	49	98·0	107·5	100·0	95·9	104·8	76·9
1791	10,663	1,169	49	95·4	110·8	100·0	88·7	97·4	76·7
1792	10,803	1,187	56	96·6	112·5	114·3	87·2	96·1	87·3
1793	10,491	1,207	56	93·8	114·3	114·0	83·4	92·3	86·9
1794	10,527	1,222	47	94·1	115·9	96·7	82·3	91·5	73·4
1795	10,940	1,208	53	97·8	114·5	109·2	84·4	94·3	82·7
1796	12,395	1,141	74	110·8	108·2	150·8	96·7	108·5	113·9
1797	10,884	1,248	62	97·3	118·3	125·9	89·9	101·4	94·8
1798	12,091	1,287	69	108·1	122·0	140·8	91·4	103·5	105
1799	12,588	1,337	84	112·5	126·8	171·2	92·2	104·9	128·2
1800	12,878	1,466	103	115·1	139·0	211·0	90·8	103·8	157·6
1801	13,746	1,543	99	122·9	146·3	201·2	88·4	101·5	149·8
1802	18,968	1,643	95	169·6	155·7	193·9	116·0	133·8	144·0
1803	13,035	1,709	98	116·5	161·8	199·6	74·8	86·7	147·8
1804	14,449	1,784	69	129·2	169·1	141·0	79·9	93·0	104·1
1805	13,391	1,799	59	124·2	170·5	119·6	73·4	85·9	88·1
1806	15,324	1,787	48	136·9	169·4	98·8	80·3	94·4	72·5
1807	13,187	1,797	50	117·9	170·4	102·4	69·6	82·2	73·4
1808	14,780	1,834	44	132·1	173·8	90·8	77·5	91·9	66·3
1809	15,284	1,875	48	136·6	177·7	97·6	78·6	93·7	71·8
1810	17,016	1,918	63	152·1	181·7	128·0	85·6	102·5	93·0
1811	16,004	1,942	81	143·0	183·9	164·5	78·7	94·7	119·1
1812	17,849	(1,975)	67	159·5	(187·2)	136·9	86·7	104·8	98·8
1813	(17,000)	(2,025)	74	151·9	(191·9)	152·0	(79·2)	97·2	109·5
1814	19,380	2,088	68	173·2	197·9	139·4	(90·3)	110·3	100·2
1815	26,230	2,139	85	234·5	202·7	173·1	118·4	145·3	124·0
1816	19,147	2,153	67	171·3	204·1	136·9	84·5	104·2	97·8
1817	15,943	2,077	63	142·5	196·8	129·2	69·8	86·5	92·0
1818	16,734	2,080	70	149·6	197·1	143·9	76·0	94·6	102·3
1819	16,842	2,070	71	150·5	196·2	145·5	76·4	95·5	103·1
1820	15,874	2,054	54	141·9	194·7	110·2	72·3	90·9	77·8
1821	15,971	1,971	46	142·8	186·8	94·4	73·3	92·6	66·5
1822	15,812	1,943	43	141·3	184·2	88·2	75·6	96·1	62·0
1823	16,323	1,936	54	146·0	183·5	110·4	79·3	101·3	77·4
1824	16,266	1,982	76	145·4	187·8	155·9	79·3	101·6	109·0
1825	16,410	1,959	103	146·6	185·7	210·0	78·1	100·8	146·4
1826	16,271	2,001	90	145·4	189·6	183·8	78·3	101·5	127·8
1827	16,472	(2,020)	72	147·3	(191·5)	147·1	77·7	101·3	102·1
1828	16,775		71	149·9		144·3	(77·8)	102·0	99·8
1829			61			125·1			86·3
1830			60			123·1			83·9

Iron and Steel Prices[1]

By LUCIEN FOLDES

1. INTRODUCTION

The Iron and Steel Act of 1953 established the Iron and Steel Board, and gave it powers to supervise the industry, to regulate its development, and to fix maximum prices. The Board's first Annual Report[2] describes the arrangements which govern iron and steel prices. They are of considerable interest, both because of the importance of the industry, and because they raise issues of principle which are common to many cases where direct controls are used in order to stabilise the prices, the profits, and the level of activity of individual industries. The purpose of this note is to compare the allocation of resources and the distribution of income which are likely to result from the methods used in recent years with those which might prevail in a free market, and then to consider the desirability of these methods.

2. SCOPE AND METHOD OF PRICE CONTROL

The Board has power to fix maximum prices for all sales of iron and steel products at all stages of production,[3] with three exceptions: export prices are excluded by statute, scrap prices are fixed by the Minister, and the prices of castings and forgings can only be regulated by the Board under certain special conditions which have not yet arisen. The Board controls the prices of goods whose total costs of production were about £550 million in 1954 and £650 million in 1955.

The Board fixes a *maximum* price for each intermediate or finished product, which is the sum of three components: cost of production, depreciation and obsolescence, and profit margin. The *cost of production* is the average of the average costs incurred by all the firms which make the profit, excluding a band of the highest-cost production. It includes levies paid to the Industry Fund (see below). In the case of tinplate and sheet there is such divergence of cost that two prices are fixed (and paid by customers), one for high- and one for low-cost producers. The allowance for *depreciation and obsolescence* depends, among other things, upon the replacement cost of assets and their estimated economical lives. *Profit margins* are assessed by reference to capital employed, and for this purpose the fixed assets (68 per cent. of the whole) are valued at original cost less depreciation at Inland Revenue rates. The margins are fixed with regard "*inter alia* to the nature of the industry, current interest rates and what might be expected to be a normal level of working in relation to capacity over an extended period of time". They are fixed at a level which would yield adequate profits if all output were sold in the home market, though in fact producers' exports (some 16 per cent. of output in 1955) generally command prices considerably above those ruling at home.[1] The Board also allows for the fact that it has more power to curtail profits in a boom than to raise them in a depression. The margins actually fixed are not set out in the Report. The price which is obtained by adding these three components is the price for the ordinary quality and size of each product; differentials are then fixed according to "current conditions" and "additional costs actually entailed".

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[1] I should like to thank Professor Sir Arnold Plant and Mr. George Slasor for the great help which they have given me in connection with the preparation of this paper.

[2] H.C. 138 of 1955. The Board's Annual Report for 1955 (H.C. 350 of 1956) did not appear until September 14th, when this paper was about to go to press. As there have been few changes in the industry's pricing arrangements, it has been possible to let the text stand, though some alterations have been indicated in footnotes.

[3] For an account of productive processes, see the Simple Guides published by the British Iron and Steel Federation.

This method of price fixing has "followed broadly the principles adopted in 1949 by the original Iron and Steel Board",[2] which were themselves developed from the principles evolved before the war by the Import Duties Advisory Committee.[3] The present report points out that the formula is "admittedly not ideal", but that it does maintain the incentive for producers to keep down their costs once prices are fixed for a period, while ensuring that economies are ultimately passed on to customers.

3. EXCESS DEMAND

In general, the maximum prices fixed by the Board, and before December 1953 by the Minister of Supply, have been below the level which would have equated the supply of British steel products with the demand (i.e. the home demand at prices which have usually been the maximum prices, and the demand for export at uncontrolled prices). There has always been excess demand for some products, and sometimes there has been excess demand for all products. The average level of finished steel prices for the British home trade has been kept substantially below the average level of home trade prices in other major producing countries.[4]

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[1] According to its second Annual Report, the Board is now willing to consider applications for special price determinations in the case of fixed price forward contracts.

[2] B.I.S.F. Annual Report for 1954, p. 19.

[3] On the origins of the price control and the Industry Fund, see the Reports of the Iron and Steel Corporation of Great Britain, H.C. 294 of 1951–52 and H.C. 198 of 1952–53.

[4] The Board's Reports contain charts showing the following index numbers of home trade prices of finished steels of ordinary qualities, excluding costs of delivery: for December 1954, Open Hearth, U.K. 100, U.S. 118, Germany 122, France 126; Bessemer, France 112, Belgium 120. For December 1955, Open Hearth, U.K. 100, U.S. 119, Germany 122, France 127; Bessemer, France 106, Belgium 118. British prices rose by 6·9% in this period, and by 12·6% from December 1954 to June 1956. Using the O.E.E.C. index of steel prices and other sources, the following rough estimates have been obtained for June 1956: Open Hearth, U.K. 100, U.S. 114, Germany 116, France 124; Bessemer, France 104, Belgium 117. The prices used are quoted prices. They include the German turnover tax (4%), but not the French net product tax (about 19½%) or the Belgian transmission tax (5%).

Accordingly, much of the analysis in this paper assumes that there is appreciable excess demand for most home-produced steel products at current maximum prices, and that this state of affairs is widely expected to continue for some time. This assumption is not, of course, intended to imply any forecast of future demand.[1] It is supposed to reflect the conditions for which the price control was designed, and which have in fact generally prevailed in recent years.

Some of the effects of the price control and of various related arrangements upon the allocation of resources and the distribution of income will now be discussed.[2]

4. EFFECTS ON THE USE OF STEEL

Because of the low prices at home there is a premium on direct exports of finished steel (as distinct from indirect exports through the steel-using industries). These exports have therefore had to be limited. Exports of sheets, plates and tinplate are controlled by the government, and producers of other steel products have agreed among themselves to limit their exports. Nevertheless, there may at times be a strong incentive for a producer or merchant to send goods abroad, even if another firm has to import similar goods at a higher price.

At home, only tinplate is now allocated by the government, but most other finished steel products have been informally rationed by individual producers. Deliveries to regular customers are usually related to amounts taken in previous periods, while orders from irregular (generally small) customers are dealt with in rotation. Thus the pattern of allocation must tend to be rigid, and to diverge from that which a free market would produce. Steel users who need more than they are allotted have to pay for imports at world prices. Those who have generous allocations of cheap steel may use it to make products which could not pay for it at free market prices.

Only a part of the saving in cost due to cheap steel will be passed on to ultimate consumers. A first approximation is that steel-using firms, if they all maximise profits, will absorb the whole sum as economic rent. A share of this rent might in turn be obtained from them by organised workers or other monopolistic suppliers, or by monopsonist buyers. However, some private firms may well be influenced by the low price of steel to fix their own selling prices below the level which would maximise profits. It is also likely that the prices at present charged by nationalised industries are somewhat lower than they would be if steel had been dearer in recent years. A further complication is that, if more steel is used in making some products than they would pay for at the free market price, such products will tend to be cheapened.

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[1] At the time of revising this paper (August 1956) there still appears to be excess demand for most qualities of home-produced finished steel, though quite probably not for cold rolled strip or sheets. Maximum prices are still in general actual prices.

[2] Comparisons will be made with the "free market"—which simply means the market as it would be in the absence of these arrangements, and does not refer to any theoretical model of a competitive market.

However, others will go short of home-produced steel, and they will be made dearer if the cost of importing the types of steel which they need exceeds the " free " price of home-produced steels of those kinds.

5. Effects on Supply: Imports and the Pattern of Costs

Imports of pig iron, scrap, ingots and semi-finished steels are in general more expensive than supplies produced at home. They are imported mainly by the industry's central buying organisation, the British Iron and Steel Corporation (B.I.S.C.) Ltd., which buys at world prices and distributes its purchases at home prices. Imported ore (some 60 per cent. of the total in terms of *Fe* content) is obtained by B.I.S.C. (Ore) Ltd., and in some years has also been distributed at a substantial loss. These losses are met from the British Iron and Steel Federation's Industry Fund, which in turn finances them by means of a uniform levy per ton of ingot production.[1]

These arrangements must affect the relative cost, and therefore the prices, of the various finished steel products. First, because the levy is raised at a uniform rate per ingot ton, a product will be made relatively cheaper (*a*) the higher the value per ton of the ingot steel used in making it, and (*b*) the lower the proportion of scrap which arises in making the product after the ingot stage. Secondly, where the cost of a material, a part of whose supply is imported at a loss, does not constitute the same proportion in the cost of all products, those products which have a relatively high requirement will tend to be subsidised. Admittedly this attempt to isolate the effects of the levy and subsidies is somewhat artificial, since these arrangements form an integral part of the system of price control. Those products which are apparently most cheapened by their operation might not be the ones to show the largest increases in cost or price if the entire system were abolished. Nevertheless, they do alter the pattern of costs and prices in the industry, and at the same time make it very difficult to discover the extent of these alterations.

Imports of tinplate are bought by the main producers, who are allowed to recover their losses from their home sales, so that a similar analysis applies. Imports of finished steels are for the most part purchased by users, who therefore have a strong artificial incentive to try to buy from British sources. At earlier stages there is no similar incentive for individual buyers, though the central organisation has an incentive to keep down the imports on which it incurs losses.

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[1] The amount of the levy is not published. Figures given in Sir Robert Shone's article, " Steel Price Policy ", in the *Journal of Industrial Economics*, vol. I, 1952–53, suggest that early in 1952 it must have been about £5 per ingot ton. The output of steel in 1952 was 16·4 mn. ingot tons, so that the total yield was then probably at the rate of about £82 mn. in a full year. This appears to have been abnormally high, since in that year large losses were made on imported ore (nearly £2 of the levy), and considerable quantities of finished steel were still being imported centrally and resold at a loss.

6. PIG IRON AND SCRAP

The bulk of both pig iron and scrap supplies is obtained from home sources. In 1955, the average proportions of pig and scrap used in steel-making were 52.7 and 56 per cent. of steel output respectively. Purchases of scrap are still subject to licence. In the case of foundry scrap and most hæmatite scraps the licences restrict the quantities as well as the qualities which may be bought, whereas licences to buy basic steel-making scrap specify qualities only.

The ratio of home scrap prices to pig prices has been kept substantially below the physical rate of substitution between the two materials. In order to avoid excessive demand for scrap, a balancing levy is made upon scrap bought by steel-makers (but not on their own arisings), the sum thus collected being remitted to users of pig.[1] The Minister invited the Board to consider this policy. The Board, while pointing out certain disadvantages, replied that they had been advised that " the system was well established, made for stability in steel prices, did not operate to curtail supplies of scrap and had not evoked complaint from the steel consuming industries ".

Taken together with the general price control, the system does help to stabilise steel prices. It moderates the rise during the present inflation, and thus reduces the fall which would follow a large reduction in demand. The consequences of this policy are discussed elsewhere in this paper. Another possible purpose of the system is to provide a cushion for profits. At present, satisfactory profits are being earned, and the price control ensures that the reduction in cost is passed on to steel users. If demand fell and maximum prices became ineffective, the industry might obtain a substantial subsidy from suppliers of scrap. In particular, producers of pig iron would benefit. First, their receipts would be augmented by the sum raised through the scrap levy. Secondly, the system reduces the cost of both materials to users, and

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[1] The amounts of the scrap levy (s) and pig remission (p) are not published, but it may be possible to make a very rough guess, as follows. The price of basic pig is 363/- a ton. Scrap prices vary by district as well as by grade, but a representative price for heavy steel scrap for steel-making might be 207/-. Now it is usually considered that a ton of scrap is equivalent to 0·75 to 0·8 ton of pig. Call this ratio r. If users are to be indifferent between the materials, it follows that

$$(363-p)r=207+s$$

The Board's second Report estimates that about 1·5 tons more pig iron will be used for steel-making in 1956 than in 1955, i.e. 11·93 mn. tons in all. Assuming that steel-makers will buy the same amount of scrap as in 1955, i.e. 5·95 mn. tons (including imports), and that the account is currently in balance, it follows that

$$5{\cdot}95\,s=11{\cdot}93\,p$$

When the Board was appointed it was assumed that $r=0{\cdot}77$. For this value we find that $p=26/2$ and $s=52/5$, and that the purchase of 5·95 mn. tons of scrap yields an annual fund (f) of £15·6 mn. If the price of scrap were simply raised to 0·77 of the price of pig, the extra cost to the industry of *home* purchases of scrap of 4·67 mn. tons, the amount bought in 1955, would be about £16·9 mn.

At present, however, it is arbitrarily assumed that $r=0{\cdot}85$, in order to reduce the demand for scrap and to encourage the development of pig production. Assuming that actual purchases of scrap are not reduced as a result, the solutions for this value are $p=35/7$, $s=71/4$ and $f=£21{\cdot}2$ mn. An additional sum of £5·6 mn. annually is thus made available for the pig remission.

therefore stimulates the demand for them; however, unless imports of either material were increased, the additional demand would have to be supplied entirely by pig production, since the low buying price of scrap would, if anything, discourage its supply.

The contention that the system does not curtail supplies of scrap is at first sight surprising, since there must be some elasticity of supply. The explanation appears to be that in recent years the industry has made special payments of various kinds to suppliers of high-cost scrap, as well as helping them in other ways, e.g. by providing labour to dismantle machinery.[1] In other words, the industry discriminates among sellers of scrap according to their elasticities of supply. Also, the Minister has raised maximum prices very rapidly. Until August, 1951, prices did not exceed £4 5s. 0d. a ton, except for special grades: since May, 1956, they are in many cases £10 or more.

The Board pointed out that the low price of scrap might encourage its use in foundries where the balancing charges used in the steel industry were not in force. This tendency is probably offset by the licencing system, though at the cost of imposing a rigid pattern of scrap use upon foundries. In the case of steel-making, also, it seems likely that the effect of fixed prices, of shortages of materials, of licensing and of central purchasing of imports has been to bring about a different, and more rigid, pattern of distribution of supplies of the various grades of scrap and pig than would be reached if each firm adjusted its purchases in response to prices which sensitively reflected changing availabilities.[2]

Finally, the system gives an advantage to firms which integrate steel-making with later stages of production—finishing mills and in some cases steel-using processes. They can use the scrap which arises at these later stages in their own furnaces, whereas independent producers have to sell their scrap at the controlled price, and the buyer has to pay the scrap levy. The system therefore encourages vertical integration, and discourages independent re-rollers and steel users from making products, or using processes, which give rise to a large proportion of scrap.

7. EFFECTS ON STOCKS

The price control and the related arrangements tend to raise the stocks of ferrous metals held at each stage of production and by merchants and consumers. First, by keeping down iron and steel prices they reduce the interest charges on stocks. A second factor is the difficulty, in a period of excess demand, of obtaining deliveries of home-produced finished steels, and in some cases of semi-finished steels and raw materials, at the times when they are required, especially where needs fluctuate unpredictably. Thirdly, the risks of stockholding are greatly reduced by the practice of keeping prices below equilibrium levels. The effort to build up large stocks tends to increase demand while it exceeds supply, and to accentuate the effect of any substantial recession.

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[1] For details of these arrangements and of the recent Scrap Drive, see B.I.S.F. Annual Reports, 1951–53, and *Steel Review*, No. 3, for July, 1956.

[2] On the adjustments which used to be made, see R. F. Fowler, " The Substitution of Scrap for Pig-Iron in the Manufacture of Steel ", *Q.J.E.*, 1937.

8. EFFECTS ON THE PATTERN OF SUPPLY OF STEEL PRODUCTS

Given the total supply of steel (which is discussed below), the control of prices is likely to affect the proportions in which the various products are turned out. In a free market, changes in demand and cost affect the relative profitability of producing different goods, and thereby create incentives to make changes in the planned pattern of production. The present system tends to reduce these incentives. Costs are held down, and prices are fixed at levels which at once restrict profits to standard margins and create widespread excess demand. Therefore changes in demand need have no effect on planned production unless they create an excess supply of any product. Small changes in costs which occur between price reviews may not justify modifications of production plans, while major changes lead to special reviews. When a review is made, prices are presumably so adjusted, within the limits set by demand, as to bring profit margins into line again.

Thus the pattern of supply will tend to be rather rigid. More is likely to be produced of some products, and less of others, than if the market were free. Since the total supply of steel is increasing, any " deficiencies " will presumably be filled in after a time, though it remains true that there will, in any period, tend to be a reduced incentive to alter the use of existing capacity, or to revise plans for replacement and extension, as conditions change. Of course the Board may try to offset these tendencies, either by modifying prices or by suggesting alterations in development plans submitted to it. To what extent this happens it is impossible for an outsider to say.

If at a given time there are any " surpluses " over free market production, they may either be surpluses of goods which would be produced at a later stage of the expansion programme if the market were free, or they may be goods which would not be made in this country even in the long period. The latter are likely to be among the first goods to require protection when British costs and prices are eventually brought into line with world levels.[1]

9. EFFECTS ON TOTAL SUPPLY OF IRON AND STEEL

In the short period, low prices may discourage marginal production in each plant to some extent, but marginal *units* have not been closed down simply because prices have been kept low. In the case of sheet and tinplate, higher maximum prices have been fixed for high-cost producers, and in some other cases payments have been made from the Industry Fund. The apparent effect is to subsidise high-cost producers; but since the arrangements are mainly necessary because prices are kept low, these producers cannot be said to receive genuine subsidies unless their total receipts per unit of output exceed the " free " price or the import price, whichever is lower. However, there are genuine taxes on low-cost producers; they receive no subsidies of this kind but their products pay the full ingot levy, and their profits are reduced by the low prices.

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[1] At present most of the import duties are suspended, but they tend to be re-imposed whenever the home supply of a product is " able to meet the demand ".

Over a period of years, the price control may affect both the rate of growth of the industry and the scale at which excess demand is eliminated. On the first point it might be argued that the growth of supply could not be retarded by price control, because the components of controlled price (see para. 2 above) are much the same as those of theoretical long-run supply price. True, the maximum prices only allow for profit margins on the original cost of existing assets, not on the cost of new assets, but on the other hand newcomers will in many cases be able to use more economical techniques than those employed by the plants whose costs are currently used for price fixing. However, maximum prices are fixed on the basis of an average supply price; since supplies of productive resources and of funds are unlikely to be perfectly elastic in the short run, the construction of new capacity may well be retarded. Also, if there are any true subsidies to high-cost producers, their replacement by new low-cost units is likely to be deferred. Thus the price control may have tended to delay development; though it may be that the government would not have allowed more rapid expansion even if there had been greater financial incentives.

Since low prices lead to extension of demand, the effect of the price control is to increase the scale which production must reach before supply and demand can be equated at prices fixed by the Board's formula. The Board's development plan[1] anticipated that this would occur in 1958, though more recent surveys seem to suggest that there may be excess demand in that year.[2]

Assuming that exports are not to be restricted indefinitely, the elimination of excess demand means that the differential between export and home prices must be narrowed until it does not exceed, for each product, the cost of sending goods abroad. Several factors might bring this about, for instance: a more rapid inflation in this country than abroad; a relative rise in British costs and controlled prices owing to imperfectly elastic supply of some factors as production expands;[3] and a relative fall in export prices as foreign production and British exports grow.

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[1] Iron and Steel Board, " Development of the Iron and Steel Industry 1953 to 1958 " (H.C. 49 dated 22.2.55).

[2] See *The Economist* for 7.1.56, pp. 57–9 and the Board's second Annual Report.

[3] Since profit margins are assessed on the original costs of assets, the higher cost of new equipment may also lead to the fixing of relatively higher prices. Any further rise in replacement costs may have the same result through its effect on allowances for depreciation.

10. EFFECTS ON TAXATION

Given the system of price control, the transfers from low- to high-cost producers tend somewhat to reduce the industry's payments of income and profits taxes. The levies are chargeable against taxable income as costs, and payable in part to producers who might otherwise be making losses or, if they were making profits, might distribute a smaller proportion than the low-cost producers whose taxable income is reduced. (But some of the subsidised plant may belong to firms making high profits from other sources.)

It is uncertain whether the government would gain in the short run if the entire price control were abolished. The following is a rough approximation: there would be a rise in iron and steel profits, though the effect of the rise in steel prices would be partly offset by the increased price of scrap. For tax purposes the rise in iron and steel profits would be largely offset by a fall in the profits of steel-using industries. In those cases where the increase in steel prices was passed on to final consumers in Britain, their demand would probably be inelastic in the short run. Expenditure on the products of other industries would fall, and so would their profits. If savings fell, or foreigners spent more on some of the products of the steel-using industries, the government's tax receipts would rise in money terms, and possibly to some extent in real terms. On the whole, the effects are unlikely to be significant. The government would lose in its capacity as a buyer of steel.

11. THE CASE AGAINST RECENT POLICY

So far, this essay has been concerned with the effects of the Board's methods of price fixing and of the various ancillary arrangements; the desirability of those methods will be considered next. Now a strong case can be made for the view that, because of the monopolistic tendencies in the steel industry, it is necessary that the Board should either fix prices itself or make periodical reviews of the prices fixed by the industry.[1] However, this cannot be the reason for fixing prices below the level which equates supply and demand when existing capacity is fully used.

Some of the effects of this policy which have been pointed out are clearly undesirable. First, it creates the need for further restrictions—of exports, of the use of scrap and of tinplate, and (in effect) of imports by individual firms in the industry. Secondly, it affects the allocation of resources in various ways which on the whole are likely to be wasteful. The main effects are these: (1) The pattern of steel use is to some extent arbitrary and rigid, so that steel is used for purposes which would be sub-marginal if prices were free. (2) The import subsidies and the ingot levy distort the pattern of costs and prices, but the complexity of the system makes it difficult to estimate the extent of the distortion. (3) The arrangements relating to pig iron and scrap, apart from contributing to the other effects by helping to keep prices down, tend to produce a rigid distribution of these materials, to encourage vertical integration, and to discourage certain processes giving rise to a high proportion of scrap. They are also capable of being used to obtain a subsidy for the whole industry, and for pig iron production in particular. (4) Stocks of iron and steel are raised. (5) The pattern of steel production may become rather rigid, and goods may be produced which would not be made in this country if the market were free. (6) Low-cost production is taxed and high-cost may in some cases be subsidised. (7) Overall growth may be retarded, while the scale needed for the elimination of excess demand is increased.

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[1] The problem of the control of monopolistic tendencies in the industry falls outside the scope of this essay. In general, foreign competition is a more effective curb on monopoly power than state control. If the complete abolition of the tariff is not practical politics because of the possibility of dumping by foreign producers in periods of bad trade, some form of integration with the European common market might be an alternative. There are of course several obstacles, one of which may be the artificially low level of steel prices at present maintained in this country.

Thirdly, the effects on income distribution do not seem to be specially desirable. The main gainers are: (1) the shareholders of some firms (and perhaps some powerful groups of organised workers) in steel-using industries, though these industries lose in their capacity as suppliers of scrap; (2) certain final consumers, at home and abroad, who may or may not be specially deserving, namely those who buy goods using more steel than they would use if its price were free, those who buy from certain firms which do not maximise profits, and those who buy certain products of nationalised industries; (3) the government, in its capacity as a steel user, and (4) any iron and steel firms receiving " genuine " subsidies. The main losers are (1) the low-cost producers of iron and steel, and (2) suppliers of scrap.

In view of the disadvantages of its policy, why has the Board not allowed prices to rise ? For the most part, the Report does not give reasons, but it may be worth while to consider some reasons which might be put forward.

12. The Case for Low Prices

(*a*) *Fear of Over-expansion.* First, it might be said that low prices were needed in order to discourage over-expansion. Now some restriction on growth might be desirable whilst there is excess demand for resources for investment; or if it is feared that, because of the instability of the demand for steel, there may later be unemployment which might spread to other industries; or if it is believed that capitalists or workers are insufficiently aware of the danger of recession, so that their supply prices do not contain adequate compensation for this risk. But the Board already has statutory power to prohibit a project (subject to an appeal to the Minister) if it considers that it " will seriously prejudice the efficient and economic development of production facilities in Great Britain ".[1] If the Board wished to restrict development (which is not its avowed policy) it would surely be more appropriate to use these powers, and leave itself free to use prices to ration out the products.

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[1] Iron and Steel Act, 1953, Section 6.

(*b*) *Price Stability.* Low prices might be defended as part of a general policy of keeping steel prices stable in the face of changing market conditions. It is worth examining in general terms the arguments which are advanced for a greater degree of price stability in the steel industry than would exist if each firm fixed its own prices.[1]

The first argument is that price fluctuations may lead to harmful speculation in stocks, which in turn accentuates the fluctuations. This argument can hardly be applied where buyers and sellers have roughly equal knowledge and are well informed about conditions of supply and demand. In such a trade stock fluctuations would generally tend to stabilise prices. For instance, a rise in prices due to a temporary fall in supply would be unlikely to create expectations of a further rise; it would probably be recognised as temporary and stocks would be reduced to relieve the scarcity.

The second argument is that fluctuations make rational business planning more difficult. But uncertainty can be avoided by making forward contracts, and it seems appropriate that any costs which this involves should fall on those who require certainty in their planning.

A third argument is that the demand and supply of steel are very inelastic in the short run, so that fluctuations would have to be very large. This argument has been used to justify a policy of stabilising prices at the level of long-run supply prices for a period as long as an entire " business cycle ".[2]

The usual objection to large price fluctuations is that they lead to large fluctuations in the (real) incomes of users and suppliers. But in the case of steel this argument seems to be much weaker than in the case of (say) certain agricultural food products to which it is frequently applied. Steel affects the cost of living of the poor relatively little in the short period, and the stabilisation of prices in the face of changing demand would tend to stabilise profits rather than the incomes of workers in the industry.

Moreover, the argument is unlikely to apply with equal force to all the products which happen to fall within the Board's purview, since there must be considerable variations in elasticities from one product to another. It would be useful to have more information on this point. Leaving aside direct exports, whose prices are already free, merchants' and consumers' stocks (25–27 per cent. of annual home consumption in 1955) can provide an appreciable source of elasticity of demand for most products for periods of (say) several months. Over longer periods, there must be considerable differences according to whether a product is used to make goods in whose costs steel forms a high proportion (e.g. ships), whether these goods are largely exported, and whether convenient substitutes are available (such as another variety of steel, or timber, aluminium, cast iron, plastics, concrete or glass). Elasticities of supply are also likely to vary from product to product according to the availability of unused finishing capacity of the appropriate kind—total finishing capacity normally exceeds capacity for producing crude steel—and according to the possibility of diverting capacity from other products.

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[1] The arguments considered are similar to those used by Dr. I. M. D. Little to justify short-run stability of coal prices. See pages 8–10 of *The Price of Fuel*. My conclusions are different, but this may be because the balance of advantage is different in the two industries.

[2] " Planning and Competition in Industry," by Sir Robert Shone, B.I.S.F., *Monthly Statistical Bulletin*, vol. 24, no. 8.

In general, there is a strong case against keeping prices equal to long-run average costs over several years when free market prices would be substantially higher or lower. When demand is high, such a policy leads to shortages and bad allocation of resources, to restrictions on exports, discrimination against foreigners, and to import subsidies; when demand is low, it accentuates unemployment and involves dumping (discrimination in favour of foreigners) and import duties.

(*c*) *Inflation and Exports.* Finally, it might be argued that a rise in steel prices in the conditions which have prevailed recently would have accentuated the inflation, and that it would have raised the costs of the exports of steel-using industries, which might have led to some loss of exports and some unemployment in those industries. These contentions clearly have some substance. But on the other hand it seems likely that a large part of the extra cost would have been absorbed by the profits of the steel-using industries. Secondly, to the extent that it was passed on to final consumers at home, only a proportion of any increase in their expenditure on the products whose prices had risen would have been taken out of savings. The remainder—probably the major part—would have been diverted from spending on other products, so that inflationary pressure in other sectors would have been diminished correspondingly. Thirdly, it is true that exports have been subsidised, but the method adopted is not selective either as regards products or as regards time, and moreover it arbitrarily places the burden of the subsidy on private persons.

14. CONCLUSIONS

On balance these arguments suggest that iron and steel prices should generally be allowed to find their own level (apart from any intervention to prevent the exercise of monopoly power, which raises problems beyond the scope of this essay). They suggest that it is generally a mistaken policy to intervene to stabilise prices when market conditions change appreciably, and in particular that prices should not be fixed for years at a time at levels at which there is considerable excess demand.

Most of the ancillary arrangements which have been described—the subsidies on imported materials, most of the payments to high-cost producers, the control over tinplate, and the restriction of direct exports —stand or fall with the Board's price control. The arrangements relating to scrap, on the other hand, can to some extent be considered separately on their merits. They could conceivably be retained as a means of subsidising the industry, even if all the rest were abolished. The case is not very strong. One would have to show why scrap iron and steel should be subject to a special tax, and why the iron and steel industry should be the most suitable recipient of a sum exactly equal to the produce of this tax. In any case, it would be undesirable for a tax and a subsidy to arise as vestiges of a defunct system of price control, rather than by the ordinary processes of legislation.

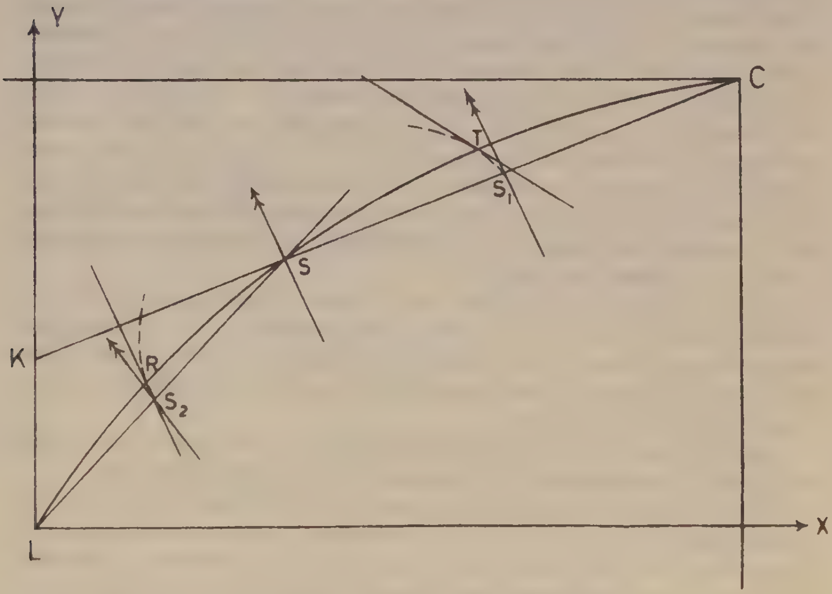
It is not, of course, the purpose of this essay to suggest that steel prices should be changed forthwith, or that the various arrangements which support the present structure should be abolished without time for adjustment. On the other hand, it is intended as a critique of the methods of regulation which have been employed in recent years, and as a statement of the aims which should govern policy if similar conditions persist in the future.

The London School of Economics.

Factor Endowment and Relative Commodity Prices: A Comment

By E. J. Mishan

There seems to have been an oversight in the construction of the first of Mr. Rybczynski's diagrams.[1] The tangents to the isoquants on either side of S (Fig. 1) are sloping in the wrong direction relative to the tangent through S. The one to the right of S, rather than being steeper as in the figure, should be flatter than the tangent at S, while the one to the left of S should be steeper. This is at once apparent if we consider the figure below based on that of Mr. Rybczynski.



Since we are to assume production functions which are homogeneous of the first degree, the tangent to an isoquant at the point S_1 is parallel to the tangent through S. Given the conventional construction of isoquants, that passing through S_1 will cut the " contract curve " through

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[1] T. M. Rybczynski, " Factor Endowment and Relative Commodity Prices," *Economica*, November, 1955.

LSC at a point *T* which is to the left of S_1. The line of mutual tangency through *T*, sloping downward to the right, will therefore be less steep than the line of tangency at S_1 and—since S_1 is parallel to *S*—less steep than that at *S*. In other words, if we extend the lines of mutual tangency indefinitely (as, for instance, those through *S* and *T*) they will converge above the " contract curve ". More generally these lines will converge on that side of the contract curve which is curved outward.

It can easily be shown,[1] moreover, that these lines of mutual tangency become less steep as we move along the " contract curve " from *L* to *C*. The decreasing steepness indicates that as more of commodity *L* is produced factor *Y* can substitute for more of *X*. In other words, if the degree of competition in the economy is held constant, the price of *Y* becomes larger relative to that of *X* as more of the *Y*-intensive product is produced.

When Mr. Rybczynski's figure is so amended, a further inference is that the price of the factor whose quantity has increased will fall relative to that of the other factor. For, as Mr. Rybczynski has shown, if we ignore inferior goods, an increase in the supply of factor *X* entails an increase in the equilibrium consumption of *K*, the *X*-intensive commodity, yet a total amount of *K* below that necessary to maintain unchanged the rate of substitution in production. In his Fig. 1 then, the new point of production and consumption will be to the right of his point *P* on the new " contract curve ". The slope of the mutual tangency through this new point will be less steep than that through *P*, indicating that in the new equilibrium the marginal physical product of *X*—and its price relative to *Y*, if the degree of competition is assumed constant—is lower than before.

Hence, with this simple model, an increase in the supply of a factor of production *X* has the same sort of price effects as a shift in consumer demand against the *X*-using product: the prices of both factor *X* and the *X*-using product fall relative to the prices of the other factor and the other product respectively.

And, of course, the converse holds true for a reduction in the supply of factor *X* or an increase in the demand for the *X*-using product.

Finally, I do not suppose that I am in any disagreement with Mr. Rybczynski if I observe: (i) that if we allow any increase in the other factor when the first factor has increased (or any decrease in the other factor when the first factor has decreased) in supply no such qualitative results which were derived from the model can be counted upon ; and (ii) that even working with the simple postulates of linear homogeneous production functions and an increase in the supply of one factor only, the introduction of more than two factors and/or more than two products renders the concept of a factor-intensive product unusable. Consequently, although the increase in supply of any one factor—provided inferior goods are not involved—will depress its price, no qualitative results can be determined for the product prices.[1]

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[1] Since the " contract curve " in the figure rises at a decreasing rate it cuts successively lower radii through origin *L*. Its path is therefore along continuously falling rates of substitution between the factors (or continuously rising rates of substitution —according to which factor we place in the denominator).

Sutton.

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[1] To illustrate, suppose that each of three factors, X, Y, and Z are used in the production of two commodities L and K, and the quantity of factor X alone is increased. Then it is possible that the increased quantity of X (*a*) considered relative to Y alone must entail an *increase* of commodity K at the expense of L in order to maintain constant the factor rate of substitution between X and Y, while (*b*) considered relative to Z alone, an unchanged rate of substitution between X and Z entails a *decrease* of commodity K and an increase of L.

With the knowledge only that the quantity of factor X has increased no qualitative conclusions may be drawn about changes in the prices or quantities of the products.

Official Economic Statistics

By R. G. D. Allen

In the House of Commons on 1st August, 1956, the Chancellor of the Exchequer announced that there were to be improvements in the collection, analysis and presentation of official economic statistics. Professor Devons' guide to British economic statistics, published in June, has thus made a very timely appearance.[1] This is in every way an admirable book—concise, accurate, readable and well produced in scarcely more than pocket size.[2] It concentrates on the essentials, starting with population and manpower, working through prices, incomes, production and trade to national income, product and expenditure. Public finance is largely excluded as a statistical field which is too technical for an introductory guide. The text never runs off at a tangent to topics such as social surveys or stock market analysis which are of less concern to those attempting to assess the economic position of the country. The book can be recommended almost without reserve to students of economic affairs, whether viewed from a desk in the City or in industry, or from a more academic chair. It is a " must " for all first- or second-year students of economics: even expert economic statisticians will find new points of detail and fresh interpretations.

There is one essential point always to be stressed. Professor Devons puts it well: " No amount of reading other people's comments on economic statistics will give the student the insight into problems of using them that he will get from actually getting into contact with the primary material himself. If students use this book as a way of escaping from this need to become familiar with the original statistical sources, it will have failed in its purpose " (pp. v–vi). Economic affairs today can scarcely be studied without considerable knowledge of economic statistics. Professor Devons is prepared to tell us where to find the statistics and how to handle them; but he does not give runs of figures—there is scarcely a table in the whole of his text—nor any analyses of particular economic questions. Skill in the full and correct use of statistics is to be acquired only from experience, by extricating oneself painfully from traps only recognised as such too late.

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[1] Ely Devons, *An Introduction to British Economic Statistics*. Cambridge University Press. 1956. vii + 255 pp. 22s. 6d.

[2] There is an occasional loose statement which Professor Devons will need to reconsider in preparing the next edition. On the coverage of the Census of Production and of the Ministry of Labour's L forms, he refers both to the inclusion of firms with " more than ten " and to the exclusion of firms with " less than ten " workers, the former being correct (pp. 58, 82). In noting (p. 139) that the *Trade and Navigation Accounts* have no analysis by country and commodity, he forgets that there is a special annual tabulation, from *Accounts* data, entitled *Trade of the United Kingdom with Selected Countries*, published in April each year. The reference (p. 202) to the Ministry of Labour's wage earnings figures as relating to a normal full-time week's work is somewhat misleading. He comments (p. 205) on the lack of any analysis of the factors leading to divergencies between movements of wage rates and earnings, without reference to the work by Bowley, and later Penrice, in the London and Cambridge Economic Service publications. Bowley's 1937 book, *Wages and Income in the United Kingdom since 1860*, is variously and not quite correctly cited (pp. 199, 206, 245).

It is impossible to read Professor Devons without being aware of the weaknesses of British official statistics, but also without being impressed by their strength. Certainly no critic can afford to ignore the fact that, whatever he may have thought before 1939, British economic statistics are now amongst the best in the world. Today we take it for granted that there should be monthly figures on employment, industrial production and retail sales, quarterly estimates of consumer expenditure in money and real terms, half-yearly analyses of the balance of payments, and annual blue books on national income and expenditure, all issued officially and with considerable speed. Looking back twenty years, we find that none of these data were then available, except perhaps in scattered and non-official form. Nor can official statisticians be accused of resting on the laurels won in the war and post-war period. In the first half of 1956, since Professor Devons' text went to press, the Board of Trade alone has issued three completely new sets of statistics—stocks in manufacturing industry (quarterly, see *Board of Trade Journal*, 14th January), expenditures on fixed capital (quarterly estimates and forecasts, see *B.T.J.*, 4th February and 5th May), and hire purchase sales and outstanding debts (monthly, see *B.T.J.*, 21st April). This is in addition to further extensions of the complex of index numbers on wholesale, import and export prices and to a revised and consolidated set of index numbers of retail sales.

Why then all the fuss ? Why does the Chancellor need to announce plans for filling " serious gaps " in official economic statistics, for introducing " more up-to-date methods " of collecting data ? The Chancellor's proposals, on examination, show up as natural, though accelerated, developments of what the official statisticians are already doing. Existing data on stocks and order books, and on fixed capital expenditures, are relatively new and still cover only part of the field; it is proposed to extend them, particularly to the distributive and service trades. Information on building " starts " and completions have been published for some time; the proposal now is to get analyses of new contracts let. Statistics of company profits are notoriously difficult to handle but the recent trend has been towards better and more frequent company accounts: selected companies are now to be asked to supply quarterly estimates of profits, on a voluntary and confidential basis, to Inland Revenue. The quarterly estimates of national expenditure are at present confined, as far as publication goes, to the total and main constituents of personal consumption: available information in this field is to be improved and consolidated.

The 1953 inquiry by the Ministry of Labour into household expenditure was on a large scale and the analysis of the material is nearly completed. It was always envisaged (see *Interim Report* of the Cost of Living Advisory Committee, Cmd. 8328, 1951) that the inquiry would be followed up by a continuing and small-scale sample investigation; this is to be done. It is fair to say that there are gaps, even serious gaps, in present statistics. But it is equally fair to note that they are already in process of being closed, quite apart from the Chancellor's proposals. But are things moving fast enough ?

A vast amount of developmental work has been done in the years since the war, within the Central Statistical Office and the Departments, all with a very limited technical staff. Since so much has needed to be built up from the foundations, the final constructions have inevitably taken a long time to erect. The revised figures of retail sales, recently introduced, provide an illustration. They are based, with 1950 as 100, on the Census of Distribution taken in 1951 in respect of trading in 1950; planning for their collection could only begin when the main analyses of the Census were available. In its turn, the Census was the first comprehensive inquiry into retail trading to be made in this country; it also needed careful and lengthy planning in advance. A list of retailers had to be built up by means of detailed field work and schedules had to be tried out on retailers who were, to say the least, suspicious of the whole project. The full Census of 1950 would scarcely have been possible without the Pilot Census taken for 1947. It took ten years, from 1946 to 1956, to get index numbers of retail sales on the present consolidated and reasonably accurate basis, ten years of close planning and of consultation with the retail trade before, during and after the major undertaking of a Census of Distribution.

Patient work by official statisticians since the war is now producing a crop of new and improved economic statistics. It might all have been done in a somewhat shorter time, given more resources or greater concentration of effort. The main question, however, is whether the rate of return can be accelerated, whether more and better figures can now be published more speedily. The Chancellor spoke of particular firms providing monthly or quarterly statistics on a voluntary basis rather than " compulsory returns of everything ". This implies the use of sampling techniques, e.g. either a random sample of manufacturing or distributive concerns or a selection (a purposive sample) of such concerns. Again, there is nothing novel here; the proposals confirm the trend in official statistics over the past ten years. Statisticians still remember the (largely) abortive efforts made in the 1920's and 1930's to get sampling techniques adopted in British official statistics. That battle does not now need to be fought, at least in the field of economic statistics. A large amount of developmental work has already been done by official statisticians on the application of techniques of sampling human and other populations in the compilation of economic data. The new series of expenditures on fixed capital are obtained from a stratified random sample of 650 companies; those of stocks in manufacturing industry from a selection of 170 large concerns. Behind these and other such series lies the programme of conducting Censuses of Production and Distribution, increasingly based on sampling methods. In this respect it is instructive to compare the Report of the Verdon Smith Committee (Cmd. 9276, 1954) with that of the Nelson Committee (Cmd. 6687, 1945). The same increasing dependence on sampling is to be seen in the mass of data consolidated into the national income and expenditure accounts, and in other fields.

Why then does the Chancellor need to say that " more up-to-date methods " are to be used in collecting economic statistics ? The reason must lie more in the field of public relations than in the need for any sweeping administrative changes in the Central Statistical Office and the Departments. A good sampling design can produce results with greater speed and with less expenditure of time and money. But it cannot in itself produce good statistics. That still depends on the basic returns, which must be made promptly, accurately and with proper understanding of what the whole exercise is about. The Chancellor's remarks must be directed primarily at those in trade and industry responsible for supplying the basic statistical returns.

It is here that we find a certain weakness of British economic statistics, as compared with the best that is done in the United States and Canada. In many important series—though by no means in all—we lag behind, both in the frequency of publication and (particularly) in the time taken to get the information available. There is no reason why the Board of Trade should take as long as three months to publish data on manufacturers' stocks, or the Ministry of Labour five months to issue figures on wage earnings. The fault here lies not so much with official statisticians but rather with those who provide the data with such apparent reluctance. If such important data as those on stocks are to be available in a few weeks, rather than months, there must be active and sympathetic co-operation from business. There is need for a general willingness—growing but all too slowly—both to make prompt returns and to accept figures which are provisional at first and subject to revision later.

There are other things which need to be considered, at the technical level, on the present position of official economic statistics. Indeed, it may well be that the time has come for a new assessment of the place, function and organisation of the Central Statistical Office in relation to the statistical work of the Departments.

The organisation of official statistics since the war has depended on a relatively small number of senior officers who came into the service during or just after the war with invaluable experience of academic work and war-time administration. Sooner or later, they will need to be replaced. It is not obvious that the right men are being thrown up within the service to replace them. Expert statisticians are scarce and the Statistician Class of the Civil Service competes with many other employers in recruiting. Everything possible needs to be done both to recruit more technical statisticians and to make the most economical use of them in the statistical organisation. It is not clear, for example, that the fullest use is being made, by in-service training in statistics and otherwise, of the material in the Executive Class.

Official statisticians inevitably devote much of their efforts to current and urgent business; the time they have for long-run developments and basic research is both limited and assigned lower priority. This raises the question of the extent to which advantage is being taken of outside statistical expertise. It is known that official statisticians seek and receive a good deal of advice both from advisory committees and more informally from many non-official statisticians. Further, certain definite jobs have been assigned to outside organisations, for example work on the location of industry and on company accounts by the National Institute of Economic and Social Research, and a detailed input–output analysis for the year 1948 by the Cambridge Department of Applied Economics, all in close collaboration with the Board of Trade. It would seem profitable to extend and develop subcontracting work of these kinds. Experimental work, on sampling design and field operations, including pilot studies, may well be assigned to independent research groups, the routine work of collection, when proved, to be taken over officially. Particular and detailed analyses of officially collected data could also be done outside, e.g. by making available a duplicate set of punchcards. In the field of long-run statistics, made as comparable as possible over time, there is nothing in this country even remotely resembling the *Historical Statistics of the United States, 1789–1945*. Such a compilation could only be achieved, as in the United States, as a result of collaboration between official and outside experts.

Finally, there are the needs of outside users of economic statistics. As the volume of available statistics grows, either published or obtainable on request, so there is greater need for guidance on where to obtain and on how to use the data. Professor Devons' book is part of the answer, particularly if brought up to date in successive editions. But it is still essential to have official guidance, and in several ways. One need is for guides to what is available year by year. Before the war there was an annual *Guide to Official Statistics*, a most useful index with cross references to the whole output of official statistics each year. A revival of this publication would be welcome. Since it first appeared in 1946 the *Monthly Digest of Statistics* has been accompanied by an annual supplement, *Definitions and Explanatory Notes*, which might well be expanded. The same idea should be applied to the *Annual Abstract of Statistics*, at present published without any technical guidance on its contents. As Professor Devons remarks, " statistics and the notes which explain and qualify them are easily parted ".

Another need is that official statisticians should be rather more forthcoming in providing, not only descriptions, but also assessments of the data they publish—and in consolidated and easily accessible form. The Inter-departmental Committee on Social and Economic Research (North Committee) has done a useful job in sponsoring a series of *Guides to Official Sources*, but there are only three of them as yet (Labour Statistics, Population Censuses and Local Government Statistics). The Central Statistical Office has ready to hand a series of *Studies in Official Statistics*; but, until the appearance this year of *National Income Statistics, Sources and Methods* (C.S.O., Studies in Official Statistics, No. 3, 1956), the series comprised only two short pamphlets on the index of industrial production. While *Sources and Methods* does describe and assess many of the major statistical series, there is still a large area of statistics—on agriculture, food, transport, fuel and power, as well as the extensive field covered by the Board of Trade—on which there is little official guidance in consolidated form.[1] It is surely wrong that an expert of Professor Devons' calibre should so often be reduced, in his account of official statistics, to phrases like: " Presumably the main argument for doing this is . . ." (p. 91 n); " It is apparently the Board of Trade view that . . ." (p. 153); " There is evidence that the coverage of the official index . . ." (p. 198 n). Certainly let us have fuller, better and more frequent statistics. But also let us have up-to-date official guidance on where they are to be found, what they mean and how they are to be used.

The London School of Economics.

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[1] The gap has been partly filled in the past by a series of articles in the *Journal* of the Royal Statistical Society, the first batch of which was collected together in M. G. Kendall (Editor): *The Sources and Nature of the Statistics of the United Kingdom.*

The Royal Commission on the Taxation of Profits and Income

By A. R. Prest

With the publication of the final instalment of the Royal Commission's trilogy, the student of public finance has a many-course feast which is likely to prove a strain on his digestion for some years to come. Quite apart from the three Reports,[1] there are a number of associated and consequential documents.[2]

Select Committees and Royal Commissions on U.K. income tax are sufficiently rare to make their findings of the highest importance. The last such Royal Commission reported in 1920, and developments since that date, both in economic theory and in the structure and practices of income taxation, have been such as to make the background to the recent deliberations very different from what it was. On the theoretical side, one need only reflect on the consequences for Public Finance of the erosion of the doctrine of cardinally measurable utility and the emergence of aggregative economics. Income taxation itself is far more developed both in this country and in others, than it was in 1920. The tax applies to many more people; it takes more forms, with a complicated intertwining of profits and income taxes levied on companies; the structure of allowances is more complicated; with P.A.Y.E., the method of collection is entirely different for many people; and rates are far higher. In 1920 the Federal personal income tax was only seven years old in the U.S.A. Now it is a much more firmly established structure and has accumulated a great deal of experience on which other countries can draw. In such circumstances, the results of an enquiry by a Royal Commission are of the utmost interest.

In a short article it is totally impossible even to describe the whole of this literature, let alone discuss it adequately, and we shall therefore mainly confine ourselves to the three Reports of the Royal Commission. But before passing on to the main theme it is only right to pause and pay tribute to the devoted and truly Herculean labours of the

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[1] The *Interim Report* (Cmd. 8761, 1953) deals with taxation of profits from overseas (pp. 20).
The *Second Report* (Cmd. 9105, 1954) deals with taxation of wages and salaries (pp. 125).
The *Final Report* (Cmd. 9474, 1955) deals with many other specific subjects and with more general problems (pp. 487).

[2] (*a*) 21 instalments of *Minutes of Evidence* (published by H.M.S.O., London, 1952-1954).
(*b*) *Documents and Memoranda* (unpublished but deposited with selected libraries in the U.K.).
(*c*) *Report of the Committee on the Taxation of Trading Profits* (Cmd. 8189, 1951).
(*d*) *Report of the Committee on the Taxation Treatment of Provisions for Retirement* (Cmd. 9063, 1954).

Commission—and to ask whether it was reasonable or ever will again be reasonable to ask a group of busy men and women to devote so much time to such a vast and intricate subject. Whatever criticisms may be levied at the end-products it is only right to emphasise the immense amount of trouble which the Reports have involved and to say that in view of the labour involved, whether we like it or not, they will simply have to be the authoritative view of the subject for many, many years to come.

Perhaps we shall be best occupied if we select some of the more important topics from the Reports, outline the Commission's views, and particularly its divergences of views, and comment where it seems appropriate. We shall therefore glance in turn at some of the suggestions about the taxation of wages and salaries, the taxation of capital gains, the system of profits taxation and the allowances for depreciation and inventory changes. Finally, we shall try to assess the contribution to the development of the subject.

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Perhaps the first point about wages and salaries is that the Commission found it expedient to issue a separate report on this subject. This alone is highly suggestive. It means that taxation of this kind of income is now sufficiently important to warrant distinct treatment; it carries the further implication that the factors determining rates of tax on these categories of income are not necessarily the same as those applicable to profits, rents, etc.

The Royal Commission makes out a convincing case for the continuation of P.A.Y.E. in its present form. Many suggestions were put before it that the present system suffers from serious faults and that there are easy ways of improving it. The Commission has no hesitation in rejecting both these views: a sample survey seems to show that P.A.Y.E. is now treated as one of the established facts of life by the majority of workers and the Commission is able to show that even the less hare-brained schemes for reform simply would not work.

The Commission also endorses the case for progressive taxation, though out of deference to popular opinion and a general appeal to " fairness " rather than on the basis of the traditional theory of sacrifice. In the Majority's view, the present system needs improvement in some relatively minor ways such as the introduction of a specific minimum relief, more relief for families (as opposed to single individuals) in the higher income brackets and the raising of the upper limit for earned income relief. This is not good enough for the Minority,[1] however, who would like to see a more generous minimum exemption limit, more differentiation between single persons and families with children and further extension of the earned income differentiation.

Two comments seem to be relevant to this aspect of the Commission's work. Both the Majority and Minority emphasise that the justification of earned income relief is that income from property is less precarious than that from work; " it doesn't stop when you stop ", to use Stamp's phrase. This is quite true as far as it goes. But equity is not the only consideration involved. Very little attention is paid to the effects of discrimination against investment income on the supply of saving, to which the Commission does in other places attach importance. It may be that the Commission regards saving as inelastic with respect to taxation of investment income. If so, it should say so more explicitly. And it would seem especially important for the Minority which shows a *penchant* for an Expenditure Tax to explain exactly how this would fit in with the proposals for increased differentiation against investment income. Secondly, the Minority's proposals on the progressiveness of the structure are based (*Second Report*, p. 80) on the assumption that retail prices rose by 100 per cent. between 1938–39 and 1953–54 *for all income groups.* Admittedly data on the differential price rises for the various income groups is scanty but such information as there is[1] and common observation alike suggest that the rise for the higher income groups has been larger than for the lower income groups. There is therefore a bias of known direction, even if unknown size, in the tables and charts on pp. 81–89 of the *Second Report*.

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[1] Numbering 4 in the *Second Report* and 3 in the *Final Report*.

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In the discussion of a capital gains tax, the differences of opinion between the Majority and Minority are much sharper. All the usual points of the argument—whether capital gains are income or not, whether to tax " money " or " real " gains, gains due to increasing annual dividends versus gains due to falling interest rates, the taxation of realised as against accrued gains, the likely yield of the tax after allowing for the loss in yield of other taxes, etc.—are discussed with great thoroughness and skill by both sides but with diametrically opposite conclusions. Naturally this is one of the points at which American experience is directly relevant, and appeals to it are frequent.

Perhaps a dispassionate survey of the issue might run on these lines. Capital gains are undoubtedly a form of income, but whether one should abstract from those gains due to changes in the general price level or changes in interest rates is indeed arguable. But having established this general point, neither the Majority view that the appropriate tax rate is the full progressive one nor the Minority view that the maximum rate should be the standard rate carry conviction. On the one hand, there is no reason why all forms of income should be taxed equally;[2] on the other, the admission by the Minority that surtax on capital gains might diminish saving and risk-bearing gives the game away. The real issue, surely, is that of the safety-valve for the system. Is it better to maintain the highly progressive tax structure on ordinary incomes and exempt capital gains; or should one tax capital gains and reduce the progressiveness of the structure? There are, of course, all sorts of other issues such as those of introducing and enforcing and collecting a capital gains tax but these are essentially ancillary to this main consideration. It is a pity that neither side quite faces up to the problem in this way.

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[1] cf. D. Seers, *The Changes in the Cost-of-Living and Distribution of Income since 1938*; and " Has the Distribution of Incomes Become More Unequal? ", *Bulletin of Oxford University Institute of Statistics*, Vol. 18, No. 1., Feb., 1956.

[2] Indeed, the Majority would have been on stronger grounds if it had argued that there is no necessary reason why all forms of income should be taxed.

The calculation of the prospective yield of a capital gains tax calls for some comment. The Majority accepts the calculations of the Board of Inland Revenue which, in their revised version, seem to indicate a yield of £75–100 m. in a year. The Minority, however, produces its own calculations to show that the ultimate yield would be £200–350 m. in a year. Nevertheless it is not difficult to see that there are some holes in the Minority's calculations. Here are a few points:

(1) In the first approach (*Final Report*, p. 380) the argument about the growth of *national* profits seems to be based on an assumption about the rate of growth of *industrial* production. This is an obvious error. It is the rate of growth of the real gross domestic product and not the industrial sector alone which is relevant to national profits. As the former only increased about two-thirds as much as the latter during the years 1948–54, this would suggest that, even if there were no other flaws in the reasoning, there should be a reduction of one-third in the estimated yield.

(2) In the second approach (*Final Report*, p. 381), the starting point is the argument that the recent rate of increase of undistributed profits has been £800 m. in a year. Professor Paish's calculations,[1] however, seem to show a lower figure than this, if allowance is made for stock appreciation, etc. Moreover, it should be remembered that prices were rising during these years, and if it were considered equitable to allow for this, the £800 m. would be still further reduced.

(3) Mr. C. T. Saunders, of the Central Statistical Office, estimates[2] that personal holdings of company securities showed a capital appreciation of £1,000 m. over the twelve-year period 1938–1950. This hardly seems to square with the £800 m. per annum estimated by the Minority.

(4) It seems to be assumed[3] that gains accruing to exempt institutions, etc., would not amount to more than £50 m. a year. Without access to the Board's data, this figure cannot be decisively challenged. But given the present rapid growth of Pension Funds and the like, one must be a little suspicious about it. Furthermore, it might well be asked how far it would be equitable to tax capital gains on life assurance company investments.

But the final comment can be left to the Board of Inland Revenue. After levying a number of criticisms (additional to those made above) at the calculations, it concludes:[4]

[1] *District Bank Review*, June, 1955.

[2] "Some Problems in the Estimation of Personal Savings and Investment", *Transactions of Manchester Statistical Society, 1954/5*.

[3] Following the Board's Memorandum 122, "Yield of a Capital Gains Tax".

[4] *Ibid.*

" The Board could not consider Mr. Kaldor's estimates as being in any way realistic ".

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Our next topic is the system of profits taxation. The Majority discusses the possibility of abolishing the present " two-tier " system of profits tax and income tax and establishing a corporation tax in its place. It is argued, however, that it would be inequitable to levy such a tax whilst continuing to subject shareholders to the full progression of the income tax system on dividends received and yet, on the other hand, the Commission cannot find any practicable way of avoiding this. This leaves the alternatives of a corporation tax based on undistributed profits or one based on total profits, either to be additional to the present income tax system. For some not very well explained reasons (covering little more than half a page) the former is rejected. In effect, therefore, the Majority proposes to substitute a flat rate corporation profits tax for the present differential system, companies continuing to pay income tax as at present.

The Minority is not convinced that there is any inequity in a system of applying a profits tax to company profits and an income tax to shareholders' dividends. Subject to the introduction of a capital gains tax,[1] it therefore recommends the abolition of the present system and the substitution of what is in effect the present U.S. system in its place.

In some ways, this discussion of company profits taxation is one of the least satisfactory parts of the report—perhaps because it is condensed into a very small space. The various conflicting principles at stake are not set out as clearly and comprehensively as they might have been. There is very little discussion of the extent to which it is thought that the incidence of a profits tax is on the company and its shareholders rather than its customers.[2] The discussion of equity would have gained by a more explicit recognition that there are several sides to it—investment income recipients versus income receivers of other kinds, rich shareholders versus poor shareholders, preference shareholders versus ordinary shareholders, etc. The relative merits of income and corporation taxes from such viewpoints as their effect on the supply of saving and its distribution between different users, or their stabilising qualities over different phases of boom and slump might also have been more explicitly listed. Nor does one feel that the discussion of the various alternative types of tax is as comprehensive as it might have been, e.g. there is very little discussion of the possibility (or impossibility) of abolishing profits taxation in respect of small closely knit companies and treating them as if they were partnerships. More reference to American and Canadian experience in these matters would have enriched the arguments.

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[1] In the absence of such legislation, no basic change in the present system is proposed.

[2] This is all the more surprising in view of the considerable amount of discussion of this topic in the *Minutes of Evidence*.

Perhaps the basic issues can be summarised in this way. If one starts with the assumption that one wants to apply an income tax once but only once to investment income then one must have something more than a system of taxing dividends received by shareholders at the appropriate progressive rate as this would exempt undistributed profits. But if one taxes undistributed profits simply at the standard rate of income tax, it is probable that shareholders as a class will be undertaxed[1] and absolutely certain that wealthy shareholders will be let off lightly compared to poor shareholders. The most logical solution would be to divide undistributed profits between the various shareholders in proportion to their aliquot share in the equity and then tax these (imputed) receipts at the appropriate rate in the scale. This, however, is obviously totally impracticable for anything but companies with a very small number of shareholders. Therefore a special tax on corporation profits must be levied. From the viewpoint of equity between shareholders as a class and others, it matters little whether we have a one- or two-tier system and whether the tax is levied on undistributed or on total profits.[2]

From other points of view, the choice of profits tax does matter, however. Such considerations as equity between individual shareholders, the encouragement of saving and the distribution of saving between different uses are obviously relevant here. If one thinks that it would be to the advantage of the economy to force more savings through the capital market then the present system, which discriminates against distributed profits, is obviously the reverse of what is needed. Further, in this case one must plump for the Majority proposal rather than the Minority one (as the former differentiates more against undistributed profits than the latter) but one might also ask whether the most appropriate solution is not to confine the profits tax to undistributed profits. The incentive to distribute a larger fraction of profits would make possible greater equity between shareholders and weaken the force of the argument for a capital gains tax quite apart from its (probably beneficial) effects on the capital market. It is perhaps worth noting that this view commends itself to Mr. Cockfield, the former Director of Intelligence and Statistics at the Board of Inland Revenue.[3]

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One of the major issues facing the Royal Commission was the question of tax allowances for the depreciation of fixed assets and for changes in the value of inventories. To some extent the Commission's field of view is restricted by its rejection of the perpetual inflation hypothesis. Nevertheless, its views are still full of interest. In respect of fixed assets, there is no division of opinion among the Commission nor any major disagreement with the views expressed by the First Tucker Committee. It is thought that any relief to business firms to allow for rising replacement costs of fixed assets is essentially a relief to the ordinary shareholder for which there is no particular justification. The Commission is not convinced that business firms have suffered from a shortage of liquid funds in recent years and that as a consequence there has been any erosion of capital. It is convinced that any system of replacement cost depreciation would be difficult to work and that any necessary relief to business firms could be secured more easily and more economically by a system of initial or investment allowances. They also throw out a suggestion (though not a firm recommendation) that such allowances could be so adjusted as to discriminate between different types of asset (rather than different types of industry as suggested by the First Tucker Committee).

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[1] The extent depending on the distribution of share ownership between surtax payers and those people or institutions (e.g. Pension Funds) not subject to tax or liable at a rate less than the standard rate.

[2] The Minority is much clearer on this point than the Majority.

[3] cf. F. A. Cockfield, " Report of the Royal Commission on the Taxation of Profits and Income, A Commentary ", *National Provincial Bank Review*, No 32, November, 1955.

In respect of inventories, there is more disagreement. The Majority recommends that a trader be not tied to any particular method of accounting for his stock but that he be allowed to adopt any of a number of methods which is suitable for his business, subject to safeguards about switching from one method to another. The Minority, however, takes the view that F.I.F.O. is the basic method of stock valuation and departures from it should be rare and exceptional.

On the whole, the Majority's treatment of fixed assets is rather better argued than the inventory case, where the section setting out the problem tends to obscure rather than enlighten. One wonders, however, precisely how the chapters on capital gains and on fixed asset and inventory valuation are supposed to hang together. If the taxation of capital gains is in general wrong, why is it right to tax those capital gains due to the revaluation, implicit or explicit, of fixed assets and stocks in times of rising prices? The Minority is more consistent in its desire to tax capital gains in the case of both liquid and physical assets.[1]

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So much for our survey of some of the more important topics covered by the Royal Commission. Space forbids similar discussion of the many other topics, some of them (e.g., treatment of companies trading overseas) of the highest importance. Instead, we must offer a few more general reflections on the work of the Commission.

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[1] There would, however, seem to be some element of inconsistency between the Minority Report and Mr. Kaldor's *An Expenditure Tax*. In the latter, he justifies a capital gains tax on the ground that individual incomes, when properly defined, include all accruals of spending power such as those implied in capital gains. He argues that in this respect individual income is entirely different from social or business income which consists of consumption plus the value of the increase in the stock of goods (rather than the real increase in their value) (*op. cit.*, p. 70). But if this is the case and the other members of the Minority think likewise, the Minority Report should argue for the exemption from taxation of capital gains in respect of fixed assets and inventories of business enterprises.

On the whole, it seems fair to say that the Commission's work is more likely to be permanently remembered for its judgment on intricate and knotty details of tax administration and policy rather than for its enunciation of general principles. Of course, there are references to general principles. Particularly noteworthy is the point in the *Final Report* when the Minority discusses the definition of income. One might also mention the discussion of the *raison d'être* of progressive taxation in the *Second Report*, although this might perhaps have been more convincing if a more thorough examination of the dubiety of some of the arguments for progressive taxation (on the lines of that by Messrs. Blum & Kalven in *The Uneasy Case for Progressive Taxation*) had been undertaken. But there is no one place where the Commission endeavours to bring together the theoretical basis of its arguments. And such statements of principle as there are tend to pay rather greater attention to the equity aspects of taxation than to its economic effects—the Commission quite clearly feels that its first duty is to consider whether A is taxed fairly compared to B rather than whether some kinds of income taxation are relatively more harmful than others to the supply of saving, the willingness to take risks and the like. Further, it must be recorded that these statements of principles do tend to be dwarfed by all the giant practical problems which the Commission has to face, and in many cases to resolve.

This judgment is not meant to be a major criticism of the Commission's work. The function of a Royal Commission *is* to consider the problems that arise in practice and to suggest solutions to them rather than to emulate the academic task of discussing the basic principles of taxation. In this respect, the Royal Commission of 1950–55 is perhaps better than its predecessor of 1920. It might be said that there was rather more discussion of a theoretical character (e.g. on tax incidence) in the Colwyn Committee's Report of 1927. But it might equally well be said that that Report would have been better without some of its more academic parts.

Although we can accept that the Royal Commission's principal task was to devote itself to problems of detail, there is none the less more than one method of discussing such details. To some, the Majority views in the *Final Report* although eminently sensible may appear a little fluffy in places, as if the weight of detail were too much for the members. The treatment of profits taxation and the arguments about inventories are examples of this. And where views are more clearly expressed the legalistic rather than the economic approach to the problems involved seems to be the dominating theme. The Minority views are certainly much more incisive and more in the spirit of Gladstone's famous dictum of 1853, " Whatever you do in regard to the Income Tax, you must be bold ; you must be intelligible ; you must be decisive ". But there is, after all, a natural presumption that the views of a group of three would be more clear-cut than those of a group of eleven. The Minority Report might have gained in effect if it did not give quite such an impression of its determination to be a Minority Report. One gets a feeling (which may be quite unjustified) that even if the Majority views had been much further inclined to capital gains taxes and U.S. type corporation taxes and the like, there would still have been a Minority Report of considerable dimensions !

But the end note must be one of unstinted admiration for the tremendous input of work—and the equally tremendous output which has emerged. With this acknowledgement a query must be coupled. These investigations might have been even more valuable if it had been possible to step outside the terms of reference and branch out more broadly into the taxation field from time to time. On the other hand, the intricacies of income or profits taxation are now such that it is difficult to imagine a Royal Commission ever again being able to encompass the whole of this field—quite apart from considering other types of taxation. Are we not in danger of evolving a tax system of such complexity that it will soon be impossible to see the wood for the trees and at the same time to make out the details of the trees ?

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Book Reviews

Trade and Welfare. By J. E. MEADE. Oxford University Press. 1955. xiv + 618 pp. 45s. Mathematical Supplement. viii + 128 pp. 25s.

This book and its Mathematical Supplement together go to make up Vol. II of a treatise on the theory of international economic policy issued under the auspices of the Royal Institute of International Affairs. It is a work of considerable importance since it demonstrates the fact that, if there is anything in welfare economics at all, then there is a good deal more in it than has so far been envisaged.

In the past writers on the subject of economic welfare have contented themselves with identifying, so far as is possible, what Professor Meade has called the conditions for a Utopian optimum. It is then tacitly assumed that half way to Utopia is better than one quarter of the way. There is, of course, a dynamic sense in which this is true but if, as is usually the case, Utopia can never be fully attained then every justification for this judgement disappears. If there exists even one restriction of competition in the economy which it is impossible in principle to remove then the liberal economist's case for less restriction breaks down. A whole new field of welfare economics opens up and Professor Meade's book represents a first attempt to explore it systematically.

In the preface and part one of the main volume and in the Mathematical Supplement (Sections II, III and IV) the technique of analysis used in the body of the work is described and justified. The justification of the method will not be universally regarded as satisfactory and more will be said about it later in this review. But the method itself is simple and elegant. Given that the situation in the economy is what it is, consider a small change in policy: for example a small change in relative taxation designed to leave total revenue unchanged. This will give rise to small changes in the consumer and producer surpluses accruing to individuals or groups. These changes are weighted appropriately by the marginal utility of money and summed. If the resulting sum is positive the policy change is desirable, if negative then it is not.

The same method enables Professor Meade to establish, for a variety of cases, the conditions for the sum of consumer surpluses to be zero, i.e. to identify the ideal position where no change is desirable. These conditions can be expressed in terms of elasticities of supply and demand, prices, tariff rates and the weights (μ_i) representing the marginal utility of money. They correspond exactly in Professor Meade's welfare economics of the second best to the conditions for Utopian welfare which have been so much discussed. Since there appears to be a separate set of second best welfare conditions for each second best situation it is evident that Professor Meade has enormously widened the scope of the subject. How far the separate conclusions which he has reached can be replaced by a single more general rule should be a subject for future thought.

In the Mathematical Supplement (Sections V to XVIII) fourteen cases are worked, all concerned with the international effects of a change in tariff or taxation policy. These fourteen cases form the basis of the verbal argument of Part II of the main volume, although an attempt is made to extend the results by the relaxation of some of the restrictive assumptions of the formal models.

The effect upon welfare of factor movements between countries is considered in Part III of the main volume. Here very little mathematics is required, since the application of the method of Part I simply demonstrates the obvious fact that migration is desirable so long as the marginal value product of any factor is greater in the new location than in the old. Complications arising out of the existence of transport costs and income redistribution are considered in turn. (Chapters XXII, XXIV to XXVII and Mathematical Supplement, Section XIX). This leads naturally to a working out of the conditions in which free trade will operate as a substitute for factor migration where this is desirable; i.e. to a working out of the conditions for complete factor price equalisation. Professor Meade's account of this is particularly clear but may leave the reader with the impression that some of the formal arguments have greater significance in practice than is likely. In view of the crucial rôle accorded to factor intensities in the theorems developed in this section, the single remark (pp. 391/392) that where there are three or more factors it is " difficult to express precisely . . . the (factor intensity) conditions which must be fulfilled . . ." should not be overlooked.

Part IV, which is relatively short, applies the consumer surplus method to multilateral systems. Here particularly points which may be of considerable importance are brought out. What really are the grounds for favouring policies designed to bring about the rebuilding of a more liberal economic order ? There is a good deal in Professor Meade's work which suggests that we may all the time be misapplying the traditional welfare arguments of classical political economy. And yet he himself still inclines to the liberal view although his reasons for doing so are illuminating; " the author . . . would conclude that the many theoretically valid arguments for policies of control . . . do not in fact amount to a conclusive case for the wholesale abandonment of a liberal policy " (p. 570).

It will not have escaped the notice of the reader of this review that, in the account given above of the consumer surplus method, a number of difficult and well known problems have been conveniently ignored. Professor Meade himself is well aware that his book is particularly vulnerable to criticism of a fundamental kind. In the preface to the main volume he confesses to a " perplexing and disturbing doubt whether his whole enterprise is a waste of time or not ". He raises two questions. The first concerns the validity of the concept of a welfare function as applied to the world or to the state. The second concerns the rôle of economic theorising itself. Can there exist such a thing as a body of knowledge called economic theory as opposed to the application of a method of analysis to some specific *ad hoc* question of policy ? These doubts, publicly expressed, impose upon the reviewer who has characterised the work as important a duty to explain, however wearisome that explanation might be, why in these matters he is apparently more on Professor Meade's side than Professor Meade himself.

There are certain ambiguities in Professor Meade's approach to the problem of community welfare which arise out of the varying interpretations put upon the weights (μ_i), referred to above as the marginal utility of money. In the first instance he explicitly assumes:—

(i) that the welfare of the state consists of the sum of the welfares of the individuals making it up; and

(ii) that the object of policy should be to maximise state welfare so defined.

In the preface (p. (vii)) he states that the individual welfares need not necessarily be independent, but the working out in the Mathematical Supplement rests upon the assumption that they are (p. 16, equation 2.1). All of this implies that the weights (μ_i) are to be interpreted as the marginal utility of money.

These basic hypotheses are justified by an argument which deserves to be quoted. " If a rich alderman replete from a city dinner should meet a starving beggar and give him a crust of his dinner roll . . . only an excess of philosophy will produce the remark that there is no basis for the judgement that the alderman will feel the loss of the crumbs less than the beggar will feel their gain " (Preface). This is true and would be acceptable if recognition of its truth were all that is required to justify Professor Meade's welfare function. Unfortunately, however, it will be objected that the maximisation of the sum of individual utilities implies equally that the last crust should be taken from the saintly hermit who scorns worldly goods and given to the prodigal son whose marginal utility of money is high. Even if we deny the right of the philosopher to question the fact that this transaction will increase the sum of welfares we must at least allow him to question whether, and in what sense, we should regard it as desirable. To accept Professor Meade's form of the welfare function is to make the very kind of arbitrary value judgement which we are trying to avoid. If there were no alternative approach we should lose more than we gain by the application of the method.

But Professor Meade, in his working out of the various cases, seems to be aware that his system has a greater generality than his explicit assumptions imply. In the text of the main volume he consistently refers to μ_i as a " weight " and at times assigns to it values, such as zero and infinity, which are inconsistent with the notion that it should represent a cardinal measure of the marginal utility of money. It should be appreciated that the abandonment of the marginal utility of money definition of μ_i is exactly equivalent to the abandonment of the two restrictive assumptions to which we have objected above. In fact Professor Meade could have shown (but he does not) that the results of Section II of the Mathematical Supplement follow without these assumptions. If we simply redefine μ_i as society's judgement of the worthiness of the ith individual to receive unit increase in money income, rather than the marginal utility of money, then the objections disappear. In this case of course we should remember that μ_i might be negative in sign if utilities are interdependent, or if i were the prodigal son.

Of course the new μ_i is no more measurable in an objective way than the marginal utility of money. Indeed the marginal utility of money remains one of the elements which determine it. No claim therefore can be made to have solved any of the problems which have been so hotly debated under the general heading of " Utility and All That ". It is right and proper that we should continue to argue about how, and in what sense, a value can be assigned to Professor Meade's weights. *But it would be as well to recognise in the meantime that we constantly require every wage-fixing board and every chancellor who changes a tax to do just that.* The function of the welfare economist is, not so much to provide formal answers to questions involving value judgements, as to present the problem in such a way that the issues involved are clear. Professor Meade has suggested a method for separating, in a variety of cases, the issue of equity, which involves a value judgement about which it may be difficult to reach agreement, from the issue of efficiency which does not.

To illustrate the second type of criticism which he feels might be levelled at his work Professor Meade refers in his preface to an article by Professor Milton Friedman and to a review by Professor H. G. Johnson of Vol. I. Both of these writers object to what has come to be called taxonomic theorising. Professor Friedman's remarks are penetrating but one cannot help suspecting that the account which he gives of the " scientific method " is a good deal too simple. It is a little difficult to see at what point the physicist, whose activities are confined solely to those processes of thought and action described, would be permitted to make use of the body of knowledge which we call pure mathematics. For pure mathematics is no more than a set of tautologies. On some interpretations of the word it may even be thought to be taxonomic since a strong element of listing is apparent in any textbook on the subject.

Moreover, is there really any clear line between propositions which are " capable of being contradicted " and those which are not; and in what sense ? For example, we do not *measure* the distances from the earth of planets. We measure something else and deduce these distances by means of trigonometrical tautologies ready to hand. In what sense can the numerical result so obtained be contradicted ? Professor Friedman says that " the ultimate check of deduced against observed facts is essential ". How do we check deduced planet distances ? Analogies in the uncertain world of mental processes are particularly dangerous; but it may be that we have an analogy in welfare economics. The only way to find out if people on the average are better off might be to ask them. But if we knew marginal cost to be everywhere equal to price (and these entities are in principle measurable) then we might be able to deduce the maximisation of welfare in some sense, a fact which it would be nice to know but which it would be impracticable otherwise to check.

The proposition that there is no theory without measurement is well enough known. Let us equally recall that measurement without a theory seldom leads to the discovery of useful results. We can criticise Professor Meade's work on the ground that it implies, perhaps misleadingly, that elasticities are the right thing to measure. But it would be necessary to turn the criticism into praise if it should turn out that they are the right thing to measure after all.

Professor Milton Friedman has a cut-and-dried rule by which he determines which economic propositions are useful in the real world and which are not. But it is a rule of doubtful validity. For propositions which are clearly not applicable to the real world by reason of any of the " methodological errors " identified by Professor Friedman may well inspire some future economist to develop results which are. They may be of great value to the policy maker in that they suggest points to consider which would otherwise be overlooked. They may also show up as false an argument which might otherwise be acceptable on intuitive grounds. It would be as comforting to be assured that those whose unenviable task it is to determine policy share Professor Meade's depth of understanding of the issues raised in this book as it would be horrifying to suppose that they merely applied the rules which have been developed without any proper understanding of the assumptions upon which they are based.

The remarks above should not be taken to mean that Professor Meade's book is entirely free of the weaknesses to which Professors Friedman and Johnson have drawn attention. There is perhaps too great a willingness to make judgements of the probable magnitude of various effects on what is almost certainly insufficient evidence. In addition it must be recognised that the mathematical models upon which much of the verbal argument is based are highly simplified. In many cases, for example, Professor Meade supposes the demand for some good to be dependent on its own price alone. From this assumption, and those of ordinary demand theory, it is at once possible to deduce that its price elasticity must be identically equal to its income elasticity. This identity may have important consequences for some of Professor Meade's results. It would certainly have important consequences if it were assumed for all goods; for in this case all elasticities, income and price, must be unity.

It is worth while to enquire why it has proved necessary to introduce such restrictive assumptions into the mathematics since superficially they do not appear in the verbal account. In the Supplement, Professor Meade proceeds by breaking down total changes in the dependent variable into the separate parts due to changes in the independent variables. These separate parts consist of a parameter, which is expressed in elasticity form, multiplied by a small change in the independent variable concerned. In the text of the main volume there is a strong tendency to refer to the percentage total change itself as a single elasticity, and not to break it down into its component partials. In order to get formal agreement therefore it is usually necessary to have only one independent variable in each functional relationship.

A good example of this is afforded by Professor Meade's treatment of the optimum tariff problem. He obtains the traditional result (Math. Supp., p. 89) only because his equations of demand (*ibid.*, p. 86) have only one variable. In his result the elasticities are partial Marshallian elasticities. But in the traditional result, which is formally the same, the elasticities are not usually to be interpreted as Marshallian. They are total elasticities which embody a set of unspecified changes. In one sense the traditional result is a less useful tautology than Professor Meade's, since a total elasticity has no meaning independent of the problem under consideration. Professor Meade's result, on the other hand, is based upon restrictive assumptions. If he had postulated more general demand functions the result would be something more complex but at the same time more useful. It would have provided a much more substantial basis for the verbal discussion and the word elasticity could at all times be supposed to retain its original Marshallian meaning.

In fact Professor Meade seems much more at home with his verbal and intuitive arguments than he does with the formal mathematics. Throughout the supplement he uses notations which will appear extraordinary to any reader who is conditioned by acceptance of normal conventions. He does not at any time distinguish between identities and equations of equilibrium, a fact which leaves ambiguities in some passages; particularly since partial derivatives are sometimes written as the ratio between finite differences and sometimes as the ratio of infinitesimals (e.g. footnote 2, p. 235).

Again, equation systems are sometimes postulated without complete recognition of the full economic order they are supposed to describe. Thus on page 49 of the Mathematical Supplement an equation (5.3) is written which must be interpreted to mean that the supply of a good is dependent on its price expressed in foreign currency. This will give rise to a very odd definition of elasticity of supply unless we assume the exchange rate to be constant. But can we assume this in the face of changes in imports and the overall assumption that the balance of payments is to remain balanced ? Also, on pp. 118 and 119 of the Mathematical Supplement one feels that if demand equations had been included in the model difficulties would have arisen. Changes in the pattern of imports are determined by the condition (20.3) that the import bill in foreign currency remains constant. But this does not imply that total spending in home currency on imported goods remains constant. In general, spending on home goods will change and the price of exports will be affected. The balance of payments is at once upset and consequent changes in the exchange rate will complicate the story.

But all these objections are matters of detail and it would be wrong to place too much emphasis upon them. It should be repeated that, if welfare economics is to be regarded as a proper field of study, then this book must be said to have considerably enlarged it. It is one not only to be read but studied.

I. F. PEARCE.

Capitalism and the Historians. Edited by F. A. HAYEK. Routledge & Kegan Paul Ltd. 1954. vii + 192 pp. 10s. 6d.

It would be a pity to regard this book as no more than a contribution to the polemics of the pessimistic and optimistic schools of historians of the Industrial Revolution. The theme which the contributors have in common—the tendency by many historians to denigrate the processes of capitalist industrialism—is made more interesting by the differences in attitude of the contributors themselves in accordance with the different intellectual traditions which they represent. Thus M. de Jouvenel, with his French concern for logic and rationality, finds that the historians' attitude to capitalism fails to make sense except in the light of the malaise which (he argues) may be postulated of the intellectual in an industrial society which an earlier generation of intellectuals helped to bring into being. Only a Frenchman could generalise with such relentless logic about his fellow intellectuals and be at once so right and so wrong. Professor Hayek, coming from further east, thinks it is due to the influence of Marx, to whose shade historians have felt it necessary to make genuflections before embarking on what they believe to be objective studies of the subject. Professor Hacker, in a miniature history of American historiography of great interest, gives us case after case of conscience-stricken American historians making value judgments about industrial society without examining the stubborn economic facts on which it rested. Professor Hutt and Professor Ashton, with the deceptive simplicity of English empiricists, think it is all a matter of bad history; bad because of the misuse of sources and the failure to take into account the economic factors which determined social conditions. This gives Professor Ashton an opportunity to tell us what some of those factors were, and to show how crude are the instruments which economic historians themselves have devised to measure them. His chapter on the standard of life will stand just so long—and it may be a long time—as the challenge which he throws out to his fellow economic historians to make a better job of it remains unanswered; and his treatment of the terms of trade throws a very welcome beam of light in a naughty world. In general, the book shows the tendency of historians to write their diagnoses on the basis of the physiology of society without taking into account its anatomy; in the case of the English-speaking historians, the reason seems to be that they allowed their hearts to speak louder than their heads; not a very shameful admission surely in the circumstances. No one will complain (least of all the contributors to this volume) if historians of Communist industrialism are some day seized with the same bias. They could make a good case.

J. D. CHAMBERS.

Trade Union Government and Administration in Great Britain. By B. C. ROBERTS. G. Bell & Sons for The London School of Economics. 1956. vii + 570 pp. 31s. 6d.

In the preface to this book the author refers to the two main considerations which were kept in mind in writing it. The first was to provide a source of factual information. The second was to investigate current problems and to assess possible future trends of development. The author has certainly succeeded in the first of these objects; in the second he is sometimes hampered by his eminent sense of fairness and his ability to see both sides of the question. For the student, however, this may enhance the value of a book which deals with controversial questions on which, by definition, there is much to be said on both sides.

On the factual side, the book does not make light reading; nor, one imagines, was it intended to do so. The diversity of trade union structure and government has imposed upon the author a task in the descriptive field which he has partly overcome by concentrating in the main on the eighteen largest trade unions which together comprise more than two-thirds of total trade union membership in this country. Even with this self-imposed limitation, however, certain sections of the book assume the character of a work of reference. In the first two chapters, comprising Part I of the book, and dealing mainly with the legal framework, it is possible to treat of trade unions in general. The remaining five parts, however, deal respectively with the structure of trade union government, with trade union elections, with trade union paid officials and administrative services, with trade union finance and with federal organisation and the Trades Union Congress.

This vast amount of material, which has been assembled by painstaking research, has been so arranged as to enable one to catch glimpses of the wood notwithstanding the trees. The ability of the author so to do is in itself no mean achievement. Nevertheless, as always, the diversity of structure and government within the trade union movement makes it no easy task to draw general inferences regarding either current problems or future trends.

The topic to which the author has chosen to devote main attention in his conclusions is the extent to which democratic control can be combined with administrative efficiency. The demands of administrative efficiency tend to centralisation of power in paid officials and executive councils. Attempts to preserve democratic control impose counter-checks at various levels and notably through the local branch and the delegate conference. "Trade union government," the author says, "is based on the assumption that members do attend branch meetings". It is an assumption, however, as he points out, which is far from being realised in practice and it is little consolation to be told that in this respect trade unions are little different from other voluntary organisations. Indeed, the question of how far they are voluntary organisations is an important matter in itself. It is one on which the author touches when he deals with the closed shop. In that connection he refers to the increasing interest which the Courts have recently shown in protecting the rights of individual members against misuse of trade union power. The alternative, he suggests, to further legal control is for the unions themselves to devise independent appeals machinery for the protection of members against arbitrary decisions.

In this connection he also draws attention to the resolution adopted by the Norwegian Trade Union Federation in 1934 which places emphasis on the rights of the individual trade union member, whereas the Bridlington rules of the British Trades Union Congress emphasise the rights of the organisations. The purpose of the Bridlington rules is to prevent inter-union strife and to that extent they further a commendable trade union objective. Their effect, however, as the author shows, has been in large measure to stereotype trade union structure and to prevent large bodies of workers from transferring from one trade union to another. They, therefore, impose a serious limitation on individual freedom. Recent events would suggest that some means, consistent with order in the trade union movement, must be found of allowing bodies of workers who are determined to change their trade union affiliation to do so without suffering, for themselves and the trade union of their choice, years of wandering in the wilderness.

With regard to the delegate conference, the author regards this level of the trade union structure, whatever its formal powers, mainly as a means for ensuring that officials and executive councils are able to sense the feeling of the union and for enabling the union to express its corporate spirit. As such he considers it an essential contribution to trade union democracy.

The author's final summing-up is a hopeful one, viz.: that, provided the trade union movement tackles its problems of government and administration which are emergent today with the vigour and imagination it has usually found to deal with its problems in the past, there is no reason why the trade unions should not maintain a fair balance between popular control and efficient administration. One may be permitted to wonder whether this is not an over-optimistic assessment. Despite all the progress the trade union movement has made to enable it to deal with the many problems for which it must share responsibility today, its structural difficulties are of long standing. The governmental problems of the modern trade union are far removed from those of the local trade clubs from which it grew. Yet one still sees much in its forms of government and administration which are a nostalgic harking-back to the forms of primitive democracy which it has always been reluctant to abandon for the forms of representative government. The fundamental problem which faces the trade union movement is the position of the local branch. With the development of the shop steward system on the one hand and district and national negotiation of wages on the other, the branch has been by-passed in matters of industrial importance which excite the interest and command the attendance of the general run of trade union members. Yet for many trade unions it remains the basic electoral level where the voting takes place which determines ultimate trade union control. There must be found for the local branch work which will excite the enthusiasm of the membership or it must be by-passed in trade union government as it has been in industrial negotiation.

H. S. KIRKALDY.

David Hume: Writings on Economics. Edited by EUGENE ROTWEIN. Thomas Nelson & Sons Ltd. 1955. cxi + 224 pp. 30s. net.

Specialised economists today want specialised selected editions, complete in respect of their own field, of the " Economic Writings " of the great unspecialised philosopher-economists of the eighteenth and nineteenth centuries. The preparation of such editions poses an insoluble dilemma apparent in this volume (as also in the recent edition of Bentham's *Economic Writings*). Hume, Bentham, and the others did not neatly or completely compartmentalise all their economic ideas, still less all that they had to say relevant to political economy, into separate specifically " economic " writings. Of course, a number of their essays and pamphlets fall right into this modern specialised category, but much, of the greatest economic relevance, which even a modern specialised economist would not want to miss, is to be found scattered through Hume's philosophical and historical writings, and, in the case of Bentham, throughout his legal and miscellaneous works. If vast multi-volume editions of " Complete Works " are ruled out, there remains the alternative of including an anthology of relevant economic excerpts gathered from extensive works mainly devoted to non-economic subjects. The selection of such excerpts is certainly apt to be a criticisable and unsatisfactory enterprise, but in the case of Hume it would perhaps have been less unsatisfactory to have included them than to have left them out. For in his interesting and thorough introduction, Dr. Rotwein is especially concerned to emphasise the interrelations between Hume's economic and philosophical ideas; and he does in fact resort to brief excerpts from Hume's Correspondence in the closing section of the book.

This difficulty apart, this volume remains a handsome and valuable one. It is divided into three parts: a long Introduction, then Hume's Essays on Economics (of which that " On the Populousness of Ancient Nations " is as long as the other eight put together), and, thirdly, some brief relevant Extracts from Hume's Correspondence.

It is extremely tantalising to contemplate the brief applications of Hume's mind to economic problems, in these balanced, lucid and stimulating fragments. There are, of course, so many further issues on which Hume's views would have been of such interest and importance. It is tempting, also to speculate as to what exactly Hume would have had to say of the classical system of ideas as represented by Ricardo or Senior, or as to what he perhaps actually *did* have to say about *The Wealth of Nations*. Foxwell once wrote that the two supreme losses in economic literature were Hume's comments on *The Wealth of Nations* and Malthus' side of the Ricardo-Malthus correspondence. The latter has now been made good: the former presumably never will be (though there is, apparently, no definite evidence that Hume ever actually wrote such comments). Anyhow, though frequently described as the forerunner of the classicals, or actually as a classical economist, all sorts of undeveloped hints in his essays, and indeed some quite explicit statements, suggest that Hume might have been most critical of some of the main classical doctrines—notably the profoundly influential Turgot-Smith savings-investment analysis and the conclusions for policy derived from it.

T. W. HUTCHISON.

International Economic Papers. No. 5. INTERNATIONAL ECONOMIC ASSOCIATION. Macmillan & Co. Ltd. 1955. 199 pp. 15s.

I.E.P. has been tending to rely increasingly, for up to a half or more of its contents, on older mainly neo-classical articles rather than on current contributions. In the first two numbers (1951–'52) only one or two of the ten articles in each had originally been published more than a few years previously, whereas almost half of each of the last three numbers (1953–'4–'5) has consisted of articles of from ten up to fifty or more years old. Certainly in view of the high standards of interest and importance of these older classic papers a grateful " Better late than never " should be the first comment. However, this extensive calling in of the old world (presumably) to make good the shortfalls of the new, has meant that a number of the individual items may have been unduly difficult to appreciate, appearing as they have in isolation from the other original writings which they have been stimulated by or are referring to, and that the volumes generally have taken on a rather excessively miscellaneous and heterogeneous character. Current articles and their readers can be expected between them to supply any necessary context or background. This can hardly be expected with regard to contributions to the Italian or Swedish controversies of twenty to fifty years ago which may hardly re-appear to the best advantage when reprinted miscellaneously and piecemeal. The I.E.A.'s admirable campaign for what C. K. Ogden called " De-Babelisation ", might be more efficiently furthered by having unified, specialised volumes in which the main developments and controversies in, say, Italian price theory or Swedish monetary theory could be followed out, while the annual I.E.P., on a smaller (and less expensive) scale could be kept mainly for current writings, as the first two numbers were.

The first three-quarters of the present volume are devoted to Italian writings and include a most enjoyable reminiscent survey by Dr. Einaudi, as well as Pareto's article of 1911 on Mathematical Economics. The essays on various problems of price theory by Pantaleoni, Jannacone, and Barone, may come as something of a revelation to any English economists who may have tended to regard Mr. Sraffa's justly celebrated article of 1926 as a kind of " sport " out of the blue. Mr. Dag Hammarskjold's piece on " The Swedish Discussion on the Aims of Monetary Policy " would be still more interesting in a volume which included some of the outstanding Swedish contributions (by Davidson, Ohlin, *et al.*) with which it is concerned. The last item in the volume, by H. Theil, entitled " Who Forecasts Best ? " is a remarkable attempt to measure the accuracy of national income forecasts in five countries of North-West Europe, and seems to suggest a very suitable subject for a comparative symposium.

T. W. HUTCHISON.

Marianne Thornton. By E. M. FORSTER. Edward Arnold. 1956. 301 pp. 21s.

Mr. Forster's biographical study of his great-aunt has already been enthusiastically noticed in the Press, and there is no need to stress again its importance as a contribution to English social history. To economic historians the Chapter on " The Birchin Lane Bank " is of special interest. The chapter consists almost entirely of the lively letters which, under the title " Letters from a Young Lady ", were printed in *The Three Banks' Review*, June, 1950, and thence reprinted in Ashton and Sayers, *Papers in English Monetary History*. Mr. Forster has reproduced the letters from his own copies, and textual comparison reveals that the copies previously published excluded, besides two paragraphs of purely family interest, two passages of some interest to historians of banking. The first of these passages gives some detail of the suspension of Williams Bank, an incident already well known. The second refers to an appeal to Rothschild for sovereigns, and illustrates the peculiar power of Rothschild in the City at that time (1825–26).

Economists will also enjoy a reference on p. 286 to Queen Victoria: it shows how strongly thrift was regarded as a virtue in the last century.

Anyone who enjoyed the "Letters from a Young Lady" is certain to enjoy this book: a letter written in the early 1880's shows still some of the quality that endeared those letters of 1825 to so many readers in 1950.

R. S. SAYERS.

Adam Smith and the Scotland of His Day. By C. R. FAY. Publications of The Department of Social and Economic Research, University of Glasgow. Vol. 3, Social and Economic Studies. The University Press, Cambridge, 1956. vii + 174 pp. 25s.

The theme of this monograph is summarized in the opening chapter (p. 2):

> This is to be a study of Adam Smith and the Scotland in which he lived and wrote, of its influence on him and his on it: a study also of the contribution which he and his fellow-countrymen, resident in Scotland and England, made to the accomplishment of the eighteenth century in politics and law, industry, literature, science and art.

This chapter, "Scotland's Augustan Age", provides the setting, and the four following chapters, "Life and Verdict", "Kirkcaldy", "Glasgow", and "Edinburgh" deal with Smith's life. "The Academic Succession" is a collection of incidents in connection with the chair of Moral Philosophy at Edinburgh; "Political Economy and the Law" discusses the relations of Smith's ideas to those of Adam Ferguson, John Millar, and William Blackstone, and the last four chapters are an episodic account of Smith's relations to some of the great figures of his day. In addition to covering a wide range of published sources, Fay makes extensive use of unpublished documents, including the Buccleugh muniments at Dalkeith. A short Appendix by A. L. Macfie of the University of Glasgow discusses, and accepts with reservations, the authenticity of the Muir portrait of Smith, which is the frontispiece of the volume.

This book makes no pretence to be a biography of Smith, an analysis of his economy theory, or a cultural history of Smith's Scotland, but it is a scholarly and urbane commentary on these topics. Fay writes in the spirit of a raconteur in a group of economists, who as the conversation turned to Adam Smith, might remark that this reminded him of what Smith had said of tobacco (pp. 61-62), or of dogs (p. 75), of what Smith and Gibbon had written of each other's classics (pp. 134-136), of Robert Burns' comments on *The Theory of Moral Sentiments* and the *Wealth of Nations* (pp. 25, 75), or of Smith's references to Blackstone's *Commentaries* (p. 96). The emphasis is on the social aspects of political economy, and its relation to people and to human institutions.

Fay reprints a memorandum of Smith's of February, 1778 to Alexander Wedderburn on the American Revolution (pp. 110-114), which had first been published in the *American Historical Review* of July, 1933, and then discusses the advice that Smith gave to Charles Townshend a decade earlier on taxation of the colonies. Possibly he writes with a touch of puckishness when he concludes, in regard to Smith's advice : " I submit, though the temple fall on me as I say it, that in the last analysis it was professorial advice which lost us the first empire " (p. 116). Throughout one has the feeling that the author had a good time in writing his book. In one place, after quoting a passage of dialectic speech : " I never catched Mallet in a Scotch accent " (p. 144), he writes on the following page : " I only once catched Cannan in an untruth ". And the reader shares in Fay's enthusiasm for his subject.

It is a delightful book, that adds much to the economist's knowledge of the *Wealth of Nations*, of Adam Smith, and of Scotland.

FRANK WHITSON FETTER.

Some Problems of Incentives and Labour Productivity in Soviet Industry. By G. R. BARKER. Department of Economics and Institutions of the U.S.S.R., University of Birmingham. Monograph No. 1 on the Soviet Economic System. Basil Blackwell. 1955. xii + 129 pp. 14s.

Labour Policy in the U.S.S.R. 1917–1928. By MARGARET DEWAR. Royal Institute of International Affairs. London and New York. 1956. viii + 286 pp. 45s.

It is difficult to imagine two books on closely related subjects differing as widely in their aim, conception and outlook as do the works under review. Mr. Barker's book is short and full of conviction ; Mrs. Dewar's work is substantial, scholarly, and full of facts. Both possess to a remarkable degree the defects of their undoubted virtues.

Mr. Barker takes us at a gentle trot from the Revolution to the eve of the Five Year Plans (chapters II and III), whisks us through four quinquennia and a war (chapter IV), and ends by giving us a bird's eye view of the whole subject with a number of interesting, though somewhat comprehensive, generalisations (chapters V and VI). His is an optimistic story of virtuous and intelligent apprenticeship, followed by a period of consummate mastery of the art of industrial relations, where errors are temporary and quickly corrected, and everything moves steadily towards a society which is in most ways ideal. In the author's view the sum-total of Soviet experience over the last twenty years completely justifies the familiar combination of *furor technologicus* and social collectivism. I am surprised to find that he claims less credit for the highly geared system of Soviet wage incentives than for the moral environment of a planned economy in which " the attitudes of workers towards their work has gradually been changed . . . and . . . a trend, which is still continuing, appears to have emerged towards relying more and more on ' contributive ' motives in the minds of workers, and less on their desire for personal financial gain ". Such statements, and similar verdicts on Stakhanovism, would probably be more acceptable as declarations of faith than in the analytical and factual garb in which they are presented. Nevertheless, this is an extremely useful and compact little book, especially for those who are acquainted with the more critical literature on the Soviet Union and wish to acquire a well rounded and vivid picture of professed aims, ideals, and preconceptions.

Mrs. Dewar's work is in a completely different line of country. Confining herself to the eleven-year period before the veil of secrecy had completely descended on Soviet policy making, she leads us through the many tergiversations of early labour policy with olympian detachment, basing herself exclusively on published official documents. In doing so she displays the cautiousness and patient regard for detail of a meticulous scholar. Nearly half the book consists of appendices, including a very welcome collection of legal decrees and ordinances concerning labour. The remainder of the text is a running commentary on this legislation with as full a statement of the internal party discussions leading up to it as the published documents will allow. I have no doubt that the book will prove extremely valuable as a work of reference. It would be unfair to criticise Mrs. Dewar for stressing information rather than direct insight—for that is after all what she sets out to do—but it might be as well to warn the reader that he is buying a well stocked larder and not a fully digestible meal. Generalisations and conclusions, however tentative, will in the main be left to his discretion, but he will always be grateful for an authoritative statement of the facts against which particular promptings of inspiration or phantasy may be reliably checked.

F. SETON.

Studies in Inter-Sectoral Relations. By P. NØRREGAARD RASMUSSEN. North Holland Publishing Company, Amsterdam. 1956. 217 pp. Kr. 14.

It is appropriate that one of the best studies of the uses to which inter-industry analysis can be put should come from Denmark, where the technique usually associated with the name of Leontief received early recognition. Nor is it surprising to find that the central chapters are devoted to the application of input-output matrices to the measurement of the terms of trade between agricultural and industrial sectors of the Danish economy. The gist of chapters VI and VII is that input-output tables can provide the weights for complex structural index-numbers which can be used to show, for example, what changes may be expected in factor and commodity prices when import prices or farm prices change, but volumes traded remain unchanged. Illustrations for the years 1947–52 are given, principally for Denmark, but also for Norway and the United Kingdom, to demonstrate the practicability of the author's calculations.

The book covers a number of other topics, however, ranging from the effect that errors in technical coefficients may have on the predicted values of other variables to an examination of structural and income changes over time. Throughout the study, the author maintains a nice balance between general exposition and empirical findings. While the treatment presumes some previous acquaintance both with Leontief models and with elementary matrix algebra, the English is sufficiently good to commend the study to a wider than expert audience.

IAN G. STEWART.

History of the American Economy. By ROSS M. ROBERTSON. Harcourt, Brace and Company. 1955. xiv + 593 pp. 47s. 6d.

The list of text-books on the economic history of the U.S.A. is depressingly long and apparently ever lengthening. The addition to it of this book, written by a financial economist of the Federal Reserve Bank of St. Louis, must, however, be welcomed. Although set in the conventional ' book-of-the-course ' framework, this work does attempt, with greater continuity and consistency than most, to analyse, rather than describe, economic situations in America's past. It avoids both institutional history and hero-worship. The author's interests are reflected in the table of contents: seventy pages are devoted to the colonial period and two hundred to the years since 1921; there are, in all, almost one hundred pages on money and banking. While Mr. Robertson speaks with greatest authority when nearest to the present or to his profession, the range of the book is extremely wide and no important subject is wholly neglected. The author is to be commended for his exposition, as, for example, in his explanation of complicated technical processes in simple language.

The book is judiciously footnoted and provided with a very up-to-date bibliography. The text is well illustrated by numerous graphs, charts and tables; the excellent quality of their reproduction is worthy of special mention.

J. POTTER.

Demographic Year Book 1955. UNITED NATIONS. New York. London: H.M.S.O. 1955. 781 pp. £2 10s.

Mainly from the stimulus of United Nations activities, substantially more and better population censuses were taken in the decade around 1950 than in any previous decade (65 countries in 1945–54 compared with the previous highest 49 in 1925–34). Also, countries which had regularly taken censuses before were requested to pay particular attention to completeness of cover and accuracy of results. The censuses of this period are thus unique in quality as well as quantity.

Census taking in itself, of course, brings no benefit; it is merely a means by which statistics may be produced which may be the basis of planning and action. The *Demographic Year Book 1955* provides the vital link in this chain, the bringing together of the census statistics from the various countries with such explanatory notes as are necessary for their use. This seventh volume of the series is thus the first to concentrate on census statistics, and will undoubtedly prove as invaluable for work in this field as its six predecessors have proved for work on the statistics derived from vital registration.

Of the 750 pages allotted to statistical tables, some 150 are devoted to what might be called the bare minimum of current vital statistics, and the remainder to census-derived statistics. Sub-divisions of the population shown include those by geographical areas within each country (urban/rural, by size of town, etc.), by size of household, sex, age (including single years), marital status, economic activity, industry, and for women, by size of family.

The volume contains the usual introductory text and cumulative list of year book tables.

N. H. CARRIER.

SHORTER NOTICES

History of the Second World War. North American Supply. By H. DUNCAN HALL. H.M. Stationery Office and Longmans, Green & Co. 1955. xvi + 559 pp. 35s.

History of the Second World War. Studies of Overseas Supply. By H. DUNCAN HALL and C. C. WRIGLEY. H.M. Stationery Office and Longmans, Green & Co. 1956. xi + 537 pp. 37s. 6d.

The first of these two volumes in the U.K. Civil Series of the history of the war, *North American Supply*, is the more important. Although it excludes the large subjects of food and petroleum supplies, it makes a substantial contribution to understanding of Anglo-American relations, especially in the critical months of 1940 and in the period of disintegration in the first half of 1945. Using the records available in Washington and Ottawa (as well as London) and being written largely in Washington, the volume is an important complement to volumes prepared at the London end of the Atlantic cable.

In *Studies of Overseas Supply* the authors have not attempted systematic coverage but have used a few examples to show what kind of problem arose and how it was handled. Examples of procurement, both cash and lend-lease, of allocation and of programming, are followed by studies of the Combined Boards, British organisation in the U.S., scientific collaboration, and Eastern Hemisphere supply.

In both these volumes the official anonymity rule has its usual odd effects. Fortunately it has allowed full recognition, in the first volume, of the immensely important services of Purvis; in the second volume there is a surprising spate of names in the chapter on scientific collaboration.

Natural Value. By FRIEDRICH VON WIESER. Reprints of Economic Classics. Kelley & Millman, New York. 1956. xlv + 243 pp. $7.50.

The latest item in this valuable series reproduces the pioneer edition of *Natural Value*, prefaced by Smart and translated by Mallock. Wieser's kind of philosophical-psychological theorising seems now very remote and dated in *genre*, though some of the contrast may be fairly superficially terminological. *Natural Value* is especially interesting on the subject of the economics of socialism, of which Wieser's analysis differs widely from that of the more characteristically " Austrian " economists.

Size, Structure and Growth of the Economy of Jamaica. By A. P. THORNE. University of the West Indies. Mona, Jamaica. 1955. iv + 112 pp.

The feature of the development of studies of national income in less developed territories has been the shifting of emphasis away from the calculation of global totals towards the presentation of sector accounts. Mr. Thorne's study of Jamaica not only presents the calculation of the gross domestic product of Jamaica for both pre- and post-war years, but also provides eleven sector accounts for the year 1952. Although the report is written " with the general reader foremost in mind ", the work will be of interest to specialists.

A Study of Saving in the United States. Volume III—" Special Studies ". By RAYMOND W. GOLDSMITH, D. S. BRADY and H. MENDERSHAUSEN. Princeton University Press. London: Geoffrey Cumberlege. 1956. xix + 476 pp. £3 8s. 0d.

This is the third and final volume of Dr. Goldsmith's massive study of American saving, of which the first two volumes were reviewed in *Economica* for February, 1956. Like its predecessors, each of the studies is characterised by very full statistical treatment, remarkably well documented and clearly presented. The book contains five major studies.

In the first paper, Dr. Goldsmith sets out in detail the basic statistics used for his well known " perpetual inventory " method of estimating national wealth and sector balance-sheets of the U.S. for 1896–1949. A paper by Dorothy S. Brady reviews statistics of family saving in 1888–1950 based on a variety of sample surveys.

Dr. H. Mendershausen provides estimates of personal wealth based on estate-tax statistics by the " Mallet " method. This method has not previously been much developed in the U.S. Its value is in any case limited by the high exemption level for estate tax ($60,000 compared with £2,000 in the U.K.) A further paper by Dr. Goldsmith is his progress report on his search among the time series used in these volumes for a satisfying function to explain aggregate personal saving. He admits to a lurking suspicion that this is a " quest for a mirage ".

In a final paper, Dr. Goldsmith sets out sources of data for the continuous series of national income, product and personal income for 1897–1949 used in the main study.

Pierre Samuel Du Pont De Nemours: On Economic Curves. Edited by G. H. Evans, Jnr. With an Introduction by HENRY W. SPIEGEL. The Johns Hopkins Press, Baltimore. Oxford University Press. 1955. 17 pp. 12s.

This is the latest addition to the Johns Hopkins Reprints of Economic Tracts. It is an English translation of a letter written in 1774 by Du Pont to the Margrave of Baden, with an accompanying diagram which must be among the first uses of geometry in economic analysis. This very interesting item is lucidly and instructively introduced by Professor Spiegel. It would certainly be valuable to have more of the Physiocrats' works—and not necessarily as rare ones as this—available in such handsome and expert (if expensive) English editions.

The Validity of International Gold Movement Statistics. By OSKAR MORGENSTERN. Princeton University. 1955. 42 pp.

International gold movement statistics have generally been regarded as among the more trustworthy sets of data used by the economic historian. In the course of a wider investigation into business cycle history, Professor Morgenstern had occasion to check the reliability of these statistics for periods both before and after the first World War. The results are presented in this pamphlet. Using some straightforward tests, the author shows that in fact gold movement statistics are subject to a very wide margin of error. In addition, there is no consistent bias, nor is there any other information which would make it possible to distinguish between the faulty and the reliable. The consequences of these findings for a great deal of past research, as well as for future work, are obvious.

Merchants, Farmers, and Railroads : Railroad Regulation and New York Politics, 1850-1887. By Lee Benson. Harvard University Press. London: Geoffrey Cumberlege. 1955. xvi + 310 pp. 45s.

The author suggests in his Preface that the fundamental cause of economic friction in the U.S.A. in the period of his survey was the problem of how the proceeds of economic activity were to be distributed to the different producers. Merchants, railroaders, financiers and farmers, themselves constituting highly heterogeneous groups, all had different ideas as to what allocation was 'proper'. New York merchants had as much to lose as western farmers from the manipulation of railroad rates and turned, in their own self-interest, to national regulation. Thus "the Interstate Commerce Act of 1887 [may be regarded] as New York's answer to the Trunk Line Pool of 1877". The political question, as it emerges from Dr. Benson's account, was not so much whether government should intervene, but at what level and to whose advantage.

Capital Formation in Canada, 1896–1930. By K. Buckley. Canadian Studies in Economics, No. 2. Toronto University Press. London: Geoffrey Cumberlege. 1955. x + 163 pp. 26s.

This book undertakes the extremely difficult task of assembling statistical series of capital formation in Canada from 1896 to 1930. Most of the tables give five-yearly rather than yearly figures. There are five chapters explaining in detail the concepts, sources, and methods of estimation employed ; and six chapters of interesting analytical discussion. The author points out that the conceptional relation between the estimates in this book and the official estimates (which begin with the year 1926), and also the procedures to be followed in order to obtain consistent historical series from 1896 to the present, are described in *Capital Formation in Canada* (National Bureau of Economic Research, *Studies in Income and Wealth*, Volume 19), which is in the press.

International Banking and Foreign Trade. Institute of Bankers. Europa Publications Ltd. 1955. 226 pp. 20s. net.

This book contains the twelve lectures delivered at the eighth international banking summer school held in Oxford in September, 1955. The emphasis is very much on the latter part of the title. The book is not for the theoretical economist, but one whose interests lie in the applied aspects of banking and international trade will find at least six of the lectures of some, although varying, value. For the student of banking, three lectures cover the post-war monetary policies of the Benelux countries, Western Germany, France, Italy and Switzerland, and their effect on foreign trade. The student of international economics is better served, with a useful survey of the post-war international trade institutions, another of the influence of exchange and payments controls on foreign trade, and, the highlight of the book, a study of the international flow of capital.

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